DRAFT FINAL REPORT
COMPREHENSIVE SITE EVALUATION PHASE II
ATLANTIC CITY INTERNATIONAL AIRPORT
AIR GUARD STATION
NEW JERSEY

September 2015

Prepared for:

Air National Guard

Prepared by:

United States Army Corps of Engineers
Omaha District

and

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Contract Number W9128F-10-D-0038
Task Order 005

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Section 1

This Comprehensive Site Evaluation (CSE) Phase II Report for Atlantic City International Airport (IAP) Air Guard Station (AGS), New Jersey presents the results of the CSE Phase II investigation. This CSE Phase II project was completed by Munitions Management Group, LLC and TLI Solutions, Inc. Joint Venture (MMG-TLI JV) Team (MMG-TLI JV as prime contractor and URS Group, Inc. [URS] as subcontractor to MMG-TLI JV) under MMG-TLI JV's United States (U.S.) Army Corps of Engineers (USACE) Omaha District Contract Number W9128F-10-D-0038, Delivery Order 005 in support of the U.S. Air Force (USAF) Military Munitions Response Program (MMRP) at Atlantic City IAP AGS. The goal of the USAF MMRP is to render munitions response areas (MRAs) safe for reuse and to protect human health and the environment.

1.1 PURPOSE

The CSE process provides the historical, anecdotal, visual, and analytical data to be used for future decision-making regarding munitions response actions. The CSE process is conducted in two distinct phases. The CSE Phase I consists of historical records review, interviews, and visual surveys. The CSE Phase II consists of visual surveys and environmental media sampling. This two-phased CSE approach is the foundation of the USAF MMRP. The USAF MMRP follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process when addressing MRAs and munitions response sites (MRSs). The CSE Phase I and Phase II are equivalent to the CERCLA Preliminary Assessment and Site Inspection phases.

The USAF CSE process requires that additional data be developed to support munitions response action decisions. The CSE Phase II Guide (USAF 2006) provides a list of primary goals for all CSE Phase II activities. These goals are as follows:

- Determine if further munitions response actions are required at the MRA investigated. A recommendation that further data collection is necessary to make this determination at the completion of CSE Phase II is not acceptable.
- Determine if there is a need for an emergency response and/or other removal action at any MRA on the installation.
- Determine the boundaries of the MRA investigated and, where appropriate, make recommendations to subdivide the MRA into discrete MRSs.
- Clarify the original munitions-related activities or sources of munitions and explosives of concern (MEC) (e.g., target areas, open burn/open detonation areas) that occurred on the MRS.
- Identify the locations of anomalies and estimate anomaly densities.
- Identify specific receptors located on or near the MRS boundaries.
- Determine the accessibility of the MRS by specific receptors and the likelihood that known or suspected MEC can affect said receptors.

- Identify any hazardous substances, pollutants and contaminants, or other contaminants of potential concern (e.g., petroleum, oil, and lubricants) that may be present.
- Determine whether munitions constituents (MC), hazardous substances, pollutants and contaminants, or other constituents have been released to the environment.
- Determine whether MC, hazardous substances, pollutants and contaminants, or other constituents have affected specific receptors.
- Collect information to support completion of tables for the Explosive Hazard Evaluation (EHE), Health Hazard Evaluation (HHE), and Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE) modules of the Munitions Response Site Prioritization Protocol (MRSPP) for each MRA/MRS (no "evaluation pending" at the completion of the CSE Phase II).
- Collect information (e.g., frost heave potential, overland flow, geologic conditions, erosion activity) to determine the migration potential for MEC and/or MC.
- Collect sufficient data to facilitate evaluation of pathway characteristics, analytical data, and target receptor information.
- Identify specific current and future land use activities within the MRS.
- Collect sufficient data to support the development of an accurate conceptual site model (CSM).
- Collect sufficient data to support cost estimating for further munitions response actions using Remedial Action Cost Engineering and Requirements (RACER).
- Collect sufficient data to support updating program management information in the Enterprise Environmental, Safety, and Occupational Health-Management Information System (EESOH-MIS), or the current management information system (MIS).

Fieldwork and subsequent evaluation of analytical data provided the information necessary to achieve these goals. Geophysical surveys were not completed as part of CSE Phase II field activities. Potential releases to the environment were investigated by collecting samples from surface soils and subsurface soils and submitting them for chemical analyses.

1.1.1 The USAF Military Munitions Response Program

The U.S. Department of Defense (DoD) designed the MMRP to address the remediation of MEC (which includes unexploded ordnance [UXO], discarded military munitions [DMM], and MC in concentrations high enough to pose an explosive hazard) and MC (at levels that would pose either a human health hazard or ecological hazard) located on defense sites. "Defense sites" are defined in 10 United States Code (U.S.C.) Section 2710 as "locations that are or were owned by, leased to, or otherwise possessed or used by the DoD. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions." The effect of this definition is to apply the MMRP to any location where there is MEC or MC, other than at the four excluded locations mentioned above.

1.1.2 Historical Development of the U.S. Department of Defense and USAF Restoration Program

The Defense Environmental Restoration Program (DERP) category for military munitions response is described in the DERP Manual (DoD 2012). This document is a companion to DoD Directive (DoDD) 4715.1, Environmental Security, and DoD Instruction (DoDI) 4715.7, Environmental Restoration Program. It provides additional and new guidance on implementation of the DERP, consistent with Public Law 107-107, DoDD 4715.1, and DoDI 4715.7. The DERP Manual confirms applicability set forth by DoDD 4715.1 and further defines the application to environmental restoration response activities and actions undertaken by the USAF that address military munitions or waste military munitions (i.e., MEC) or the chemical residues of munitions (i.e., MC). **Appendix A** provides additional definitions associated with the MMRP.

1.2 PROJECT DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of data and define the level of certainty required to support remedial decisions. The following subsections describe the DQO development process (USEPA 2006) in accordance with USAF data requirements for the CSE Phase II (USAF 2006).

1.2.1 State the Problem

Historical activities related to DoD operations at Atlantic City IAP AGS may have resulted in contamination of environmental media at the following MRA:

- Pistol and Machine Gun Range (SR891)

1.2.2 Identify the Goal of the Study

The goals of the CSE Phase II are to provide sufficient data to determine the presence or absence of contamination at these sites, such that one of the following decisions can be made:

- Recommend No Further Action (NFA).
- Recommend Administrative Actions (e.g., administrative closure based on operational status of MRA, error in MRA acreage calculations, etc.).
- Identify the need for emergency response and/or other removal action at any site if MEC is discovered during the investigation.
- If any MC is detected in concentrations that may pose a potential risk to human health or the environment, further investigation or remedial action may be warranted. If detected MC is judged to pose an immediate threat to human health or the environment, an interim removal action may be recommended.

1.2.3 Identify Information Inputs

For this investigation, inputs to the decision-making process include findings of the visual surveys and the collection and chemical analysis of soil samples. All analytical data will be compared to screening levels to determine if releases have occurred at concentrations exceeding levels of potential concern. The hierarchy of screening levels for soil is presented in **Section 4.4**.

1.2.4 Define the Boundaries of the Study

The location for the CSE Phase II investigation at Atlantic City IAP AGS is shown on **Figure 2-2**. Surface and subsurface soils as well as groundwater are the media of concern.

The CSE Phase I visual survey was completed in August 2010 and the CSE Phase I report was finalized in April 2012. Field activities for the CSE Phase II investigation were started and completed in September 2014. The CSE Phase II field activities included visual surveys; X-ray fluorescence (XRF) field analysis; surface and subsurface soil sampling; and groundwater sampling.

1.2.5 Develop the Analytical Approach

The proposed actions for the investigation area at Atlantic City IAP AGS addressed by the Sampling and Analysis Plan (SAP) were developed using the Project Goals listed in Section 2.2 of the CSE Phase II Work Plan (WP) (MMG-TLI JV 2014). The data collection design presented in the CSE Phase II WP is based on these proposed actions and evaluation of existing data. The project team reviewed the CSE Phase II WP (including the SAP, Health and Safety Plan [HSP], and Quality Assurance Project Plan [QAPP]) and provided input during data collection activities, analysis of data, and preparation of reports.

1.2.6 Specify Performance or Acceptance Criteria

The probability of making an incorrect decision using the collected data, which may contain sampling design or measurement errors, were minimized and controlled by following standard operating procedures (SOPs) as described in the Atlantic City IAP AGS CSE Phase II WP (MMG-TLI JV 2014). Data quality evaluation procedures and determination of usability are discussed in **Section 4.5** of this report. The results of quality assurance (QA)/quality control (QC) efforts during sample collection and analysis, in combination with professional judgment, were used to evaluate the usability of chemical data for making decisions.

1.2.7 Develop the Detailed Plan for Obtaining Data

Based on review of applicable guidance documents (e.g., USEPA 2013), the proposed sampling approach was adequate to address the principal study question. Additional data needs will be evaluated and incorporated into the data collection design, as needed, to address the principal study question.

1.3 PROJECT MANAGEMENT

The key personnel for the CSE Phase II at Atlantic City IAP AGS and contact information are provided in **Table 1-1**.

TABLE 1-1
KEY PROJECT PERSONNEL

Organization	Name and Project Role	Telephone Number / E-mail Address
NGB/A7OR	Mark Dickerson, ANG MMRP Program Manager	(240) 612-8445 mark.dickerson2.civ@mail.mil
NGB/A7OR	Richard McCoy, ANG Environmental Restoration Program Manager	(240) 612-8541 richard.p.mccoy4.civ@mail.mil
177th Fighter Wing	Major Richard DeFeo, Atlantic City IAP AGS, Base Environmental Manager, Environmental Compliance, Natural Resources, Cultural Resources	(609) 761-6303 richard.defeo@ang.af.mil
Federal Aviation Administration	John Floyd, Environmental Protection Specialist / Wildlife Biologist	(609) 485-6938 john.floyd@faa.gov
Booz Allen Hamilton	Patrick Kelly, NGB/A70R Program Support	(240) 612-8830 patrick.m.kelly140.ctr@mail.mil
USACE, Omaha District	David Johansen, Project Manager	(402) 995-2729 david.r.johansen@usace.army.mil
MMG-TLI JV	George Duba, Program Manager	(303) 763-7188 gduba@tlisolutions.com
MMG-TLI JV	Chad Webb, Project Manager	(615) 656-4074 chad.webb@mmg-us.com
URS	Jacquelyn Harrington, Deputy Project Manager	(402) 952-2533 jacquelyn.harrington@urs.com

Notes:
AGS = Air Guard Station
ANG = Air National Guard
IAP = International Airport
MMG-TLI JV = Munitions Management Group, LLC and TLI Solutions, Inc. Joint Venture
MMRP = Military Munitions Response Program
NGB/A7OR = National Guard Bureau, Air National Guard, Installations and Mission Support Directorate, Operations Division, Restoration Branch
URS = URS Group, Inc.
USACE = United States Army Corps of Engineers

1.4 PROJECT SCOPE

The CSE Phase II project objectives were achieved through the following specific tasks:

- Prepare a WP for submission to the CSE Phase II project team.
- Conduct visual surveys to determine the potential presence of munitions debris and/or MC.

- Collect and analyze surface soil and subsurface soil samples to determine if MC or other suspected contaminants have been released to the environment at levels that would pose either a human health hazard or ecological hazard.
- Evaluate analytical data from the sampling effort to determine whether released MC or other contaminants present significant potential risk to specific MRA receptors.
- Collect sufficient data to determine migration potential for MC, and evaluate potential pathway characteristics at the MRA.
- Support public participation and prepare two fact sheets—one introducing the CSE Phase II and the second presenting the findings of the CSE Phase II.
- Collect information to support updating tables for the EHE, CHE, and HHE modules of the MRSPP for the MRA.
- Update the RACER and EESOH-MIS data to include CSE Phase II information.
- Enter the updated MRSPP, RACER, and EESOH-MIS data into the Data Management Tool database.
- Prepare updated maps to meet the requirements of the National Defense Authorization Act, Section 311-2710(A)–(D).
- Update the CSM.
- Prepare a CSE Phase II Report in accordance with the government-furnished CSE Phase II report outline.
- Update the Administrative Record and Information Repository.

1.5 REPORT ORGANIZATION

This report is organized into the following 14 sections:

- **Section 1 – Introduction**: Introduces the project and presents the objectives, management, and organization of the report.
- **Section 2 – Installation Background**: Describes the location and operational history of Atlantic City IAP AGS and the MRA associated with Atlantic City IAP AGS.
- **Section 3 – Physical and Environmental Setting**: Describes the climate, topography, hydrology, soil and vegetation, geology and hydrogeology for Atlantic City IAP AGS.
- **Section 4 – Investigation Scope and Approach**: Summarizes the field activities completed during the CSE Phase II, including approach and methodologies.
- **Section 5 – Munitions Response Area Characteristics**: Describes the MRA, the history of activities, the current land use(s), access controls and restrictions, field sampling procedures, and identifies potential receptors.
- **Section 6 – Evaluation of Known/Suspected MEC**: Describes the technical data for potential MEC at the MRA, the primary sources and release mechanisms associated with

the MEC, the MEC locations and secondary sources, the MEC penetration estimates, any special considerations associated with the MEC, and any known MC, as well as any Explosives Safety Submission (ESS) information.

- **Section 7 – Evaluation of Hazardous Waste/Substances**: Describes the hazardous waste activities and characteristics, the source areas, the contaminants of concern as well as any known or suspected releases, and any special considerations associated with the MRA.
- **Section 8 – Conceptual Site Model**: Presents the CSM for MC at the MRA and evaluates the media transport mechanisms associated with any potential MC present.
- **Section 9 – Human Health Risk Screening**: Discusses the results of the human health risk evaluation where maximum detected chemical concentrations for each medium evaluated were compared to generic screening levels established for the protection of potential human receptors.
- **Section 10 – Ecological Risk Screening**: Discusses the results of the ecological risk evaluation where maximum detected chemical concentrations for each medium evaluated were compared to generic screening levels established for the protection of potential ecological receptors.
- **Section 11 – Munitions Response Site Prioritization Protocol**: Summarizes the results of the updates to the EHE, the CHE, and the HHE modules, and discusses development of the MRSPP score for each MRA.
- **Section 12 – Perchlorate Reporting**: Not applicable. Perchlorate was not identified as a potential MC and; therefore, was not evaluated as part of the CSE Phase II activities at Atlantic City IAP AGS.
- **Section 13 – Summary and Conclusions**: Presents the summary and conclusions of the CSE Phase II Report.
- **Section 14 – Recommendations (Future Investigation and/or Action)**: Provides recommendations regarding cohort assignment, process streamlining opportunities, future response actions and objectives, identifies any gaps in the CSM, ranks the DoD MRSPP priority, and provides any site sequencing considerations.

The appendices are organized as follows:

- **Appendix A – Definitions**: Provides common program definitions.
- **Appendix B – Abbreviations and Acronyms**: Provides the abbreviations and acronyms used in this document.
- **Appendix C – References**: Provides references used to develop this document.
- **Appendix D – Photo Documentation Log**: Presents photographs taken during the CSE Phase II field activities.
- **Appendix E – Field Notes and Forms**: Presents the field notes and forms used during the CSE Phase II field activities.

- **Appendix F – Munitions Technical Data Sheets**: Presents technical information regarding the munitions that are suspected to be associated with the Atlantic City IAP AGS MRA.
- **Appendix G – Geophysical Survey Data**: Not applicable. Geophysics were not required as part of the CSE Phase II activities at Atlantic City IAP AGS.
- **Appendix H – Summary of Analytical Data**: Presents the CSE Phase II analytical result tables by media.
- **Appendix I – Data Review and Validation**: Presents the review and validation findings for the CSE Phase II analytical data.
- **Appendix J – Background Calculations**: Provides the background data collected during the CSE Phase II.
- **Appendix K – MRSPP Tables**: Presents the MRSPP tables.
- **Appendix L – RACER Data Input Worksheets**: Presents the RACER worksheets.
- **Appendix M – EESOH-MIS Data Input Worksheets**: Presents the EESOH-MIS worksheets.
- **Appendix N – Documentation of Public Participation Support**: Presents the fact sheets developed for the CSE Phase II.

Section 2

This section discusses the location, operational history, identification of MRAs, munitions-related activities, and previous investigations at Atlantic City IAP AGS.

2.1 LOCATION AND SETTING

Atlantic City IAP AGS is located in southern New Jersey, nine miles northwest of Atlantic City. Currently, the Atlantic City IAP AGS lies within the Federal Aviation Administration (FAA) William J. Hughes Technical Center. The FAA Technical Center occupies 5,052 acres situated in Atlantic County, New Jersey, within the Townships of Egg Harbor, Hamilton and Galloway. Two areas within the FAA Technical Center and totaling approximately 300 acres are leased to the USAF and occupied by the New Jersey Air National Guard (NJANG). An installation location map is presented on **Figure 2-1**.

2.2 INSTALLATION MISSION AND OPERATIONAL HISTORY

In 1942, Atlantic City Naval Air Station (NAS) was constructed on 2,444 acres of land owned by the city of Atlantic City in Egg Harbor Township, New Jersey that was leased to the United States Navy. The mission of the Atlantic City NAS was to train various carrier air groups consisting of fighter, bomber and torpedo squadrons and their crews for combat. In August 1943, Atlantic City NAS changed its mission to strictly fighter training consisting of low and high altitude gunnery tactics, field carrier landing practice, carrier qualifications, bombing, formation tactics, fighter direction, night operations and an associated ground school curriculum.

The Atlantic City NAS was decommissioned in June 1958 and the lease was transferred to the Airways Modernization Board. In July 1958, the then Federal Aviation Agency, now FAA, took over operations of the Airways Modernization Board including the former Atlantic City NAS. The FAA purchased most of the former Atlantic City NAS from the city of Atlantic City, with the exception of 83.64 acres retained by the city of Atlantic City. The FAA expanded the former U.S. Navy land parcel to approximately 5,000 acres and established a research and development facility that eventually became the current William J. Hughes Technical Center and a training center for the Federal Air Marshal Service. The city of Atlantic City developed the 83.64 acre parcel into the Atlantic City Municipal Airport. The South Jersey Transportation Authority (SJTA) initially leased portions of the airport from the city of Atlantic City and now serves as the Atlantic City International Airport owner and operator. The SJTA also leases a portion of the airport from the FAA. The airport is currently undergoing a $40 million terminal and taxiway expansion project, which will more than double the size of current facilities.

In November 1958, the then 177th Fighter Squadron of the NJANG relocated from their base at Newark to the FAA leased property at the former Atlantic City NAS. The FAA facility also serves as a base for the NJANG 177th Fighter Wing operating the F-16C/D Fighting Falcon, and the U.S. Coast Guard Air Station Atlantic City operating the HH-65 Dolphin.

2.3 SUMMARY OF MEC-RELATED ACTIVITIES

All MEC-related activities associated with Atlantic City IAP AGS were researched during the CSE Phase I (FPM/URS 2012). The CSE Phase I activity compiled and evaluated information on Atlantic City IAP AGS relating to past military munitions activities, physical site conditions, and future land uses and activities. Information sources included national, regional, and local archival records, interviews with Atlantic City IAP AGS personnel, and observations made during the field reconnaissance. No MEC-related activities were identified at Atlantic City IAP AGS; however, munitions-related activities at Atlantic City IAP AGS included small arms training. **Table 2-1** summarizes the munitions-related activities associated with the Atlantic City IAP AGS MRA.

2.4 IDENTIFICATION OF MUNITIONS RESPONSE AREAS

The following MRA has been identified at Atlantic City IAP AGS as having met the criteria for inclusion in the MMRP: Pistol and Machine Gun Range (SR891). The current activity level for the MRA is listed as "closed" on **Table 2-1**. This MRA, eligible for the MMRP, was investigated during this CSE Phase II and is briefly introduced in the following sections.

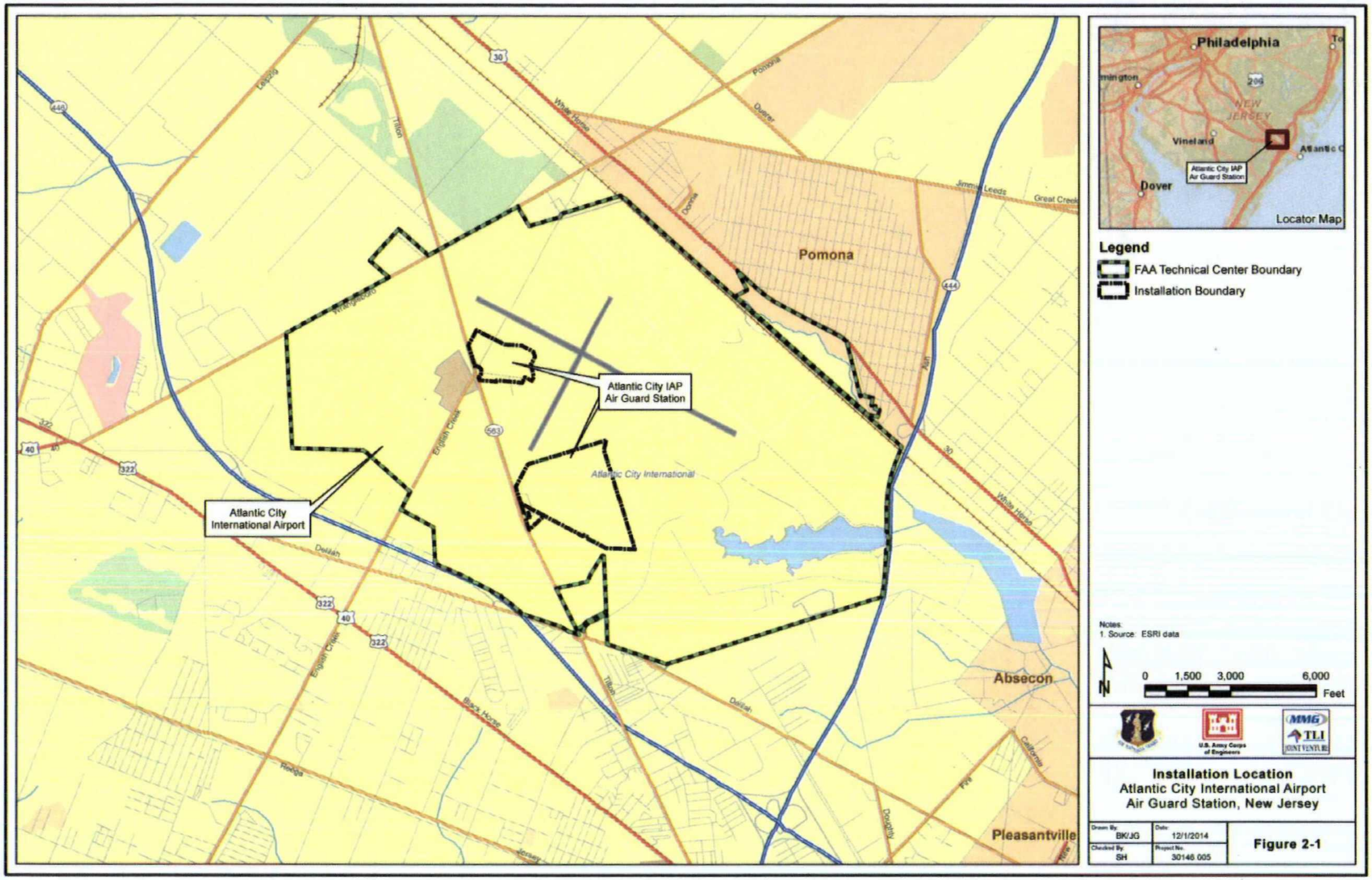
TABLE 2-1
MRA SUMMARY INFORMATION

MRA ID / MRS ID	Name	Location	Munitions Types and Activities	EESOH-MIS Acreage	Approximate Dates of Operation	Current Activity Level
891 / SR891	Pistol and Machine Gun Range	Atlantic City IAP AGS	Small arms; small arms training	8.5[1]	Mid 1940s - Mid 1990s	Closed

Notes:

[1] The CSE Phase II investigation started with the acreage developed from the previous investigation (i.e., the CSE Phase I). The data from that report references a 5.4-acre area encompassing the Pistol and Machine Gun Range (SR891) and a portion of a Skeet Range, which was obtained from an Archive Search Report (USACE 1996). The specific acreage for the Pistol and Machine Gun Range (SR891) was reported as "unknown" in the CSE Phase I Report. Additionally, according to NGB/A7OR, the Report to Congress errantly reflected a size of 8.5 acres for the Pistol and Machine Gun Range (SR891).

AGS = Air Guard Station
EESOH-MIS = Enterprise Environmental, Safety, and Occupational Health Management Information System
IAP=International Airport
ID = identification
MRA = munitions response area
MRS = munitions response site


Philadelphia
Vineland
Dover
Atlantic City IAP Air Guard Station
Locator Map
Legend
FAA Technical Center Boundary
Installation Boundary
Pomona
Absecon
Pleasantville
Atlantic City IAP Air Guard Station
Atlantic City International Airport
Atlantic City International
Notes:
1. Source: ESRI data
0 1,500 3,000 6,000
Feet
Installation Location
Atlantic City International Airport
Air Guard Station, New Jersey
Drawn By: BK/JG
Date: 12/1/2014
Checked By: SH
Project No. 30146.005
Figure 2-1

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2.4.1 Pistol and Machine Gun Range (SR891)

The Pistol and Machine Gun Range (SR891) was identified as a potential MMRP site during the Historical Records Review of installation maps, aerial photographs, inspection reports, and correspondence documents. Initial use of this range began in the 1940s. The pistol range was reported as being active up until the mid-1990s, while the machine gun portion was reportedly demolished in the 1960s. The Pistol and Machine Gun Range is no longer used for training. The remaining portions of the range (berm and firing lanes) are currently fenced and access is limited to employees and qualified visitors. The location of this MRA is shown on **Figure 2-2** and MRA-specific information is presented on **Figure 2-3**.

2.5 IDENTIFICATION OF MUNITIONS RESPONSE SITE SUBDIVISIONS

An MRA is any area located on a defense site that is known or suspected to contain UXO, DMM, or MC; while an MRS is a discrete location within an MRA that is known or suspected to require a munitions response. MRAs are often large geographical areas that may encompass an entire military range (thousands of acres). The DoD may subdivide an MRA into one or more MRSs after determining historical use of the MRA, identifying where munitions-related activities occurred, and/or after investigative activities. No subdivision of the MRA has been made based on the results of the CSE Phase I (FPM/URS 2012).

2.6 PREVIOUS INVESTIGATIONS

2.6.1 Comprehensive Site Evaluation Phase I

The CSE Phase I (FPM/URS 2012) reviewed historical records from on- and off-site data repositories, and completed interviews with personnel knowledgeable about munitions-related activities identified at Atlantic City IAP AGS. A non-intrusive visual survey of the installation was completed in August 2010 to identify physical evidence of MRA activities. MRA boundaries were established and Interim Conceptual Site Models (ICSMs) were developed. The CSE Phase I initially identified two potential MRAs: Pistol and Machine Gun Range, and Skeet Range. The Pistol and Machine Gun Range was recommended for CSE Phase II efforts and is the focus of this report, and the Skeet Range was determined to meet the Formerly Used Defense Sites (FUDS) eligibility criteria.

It should be noted that a boundary for the Pistol and Machine Gun Range (SR891) was not included in the Atlantic City IAP AGS CSE Phase I Report. Therefore, no boundary is presented on **Figure 2-3**. Additionally, the 5.4 acres initially reported in the Atlantic City IAP AGS CSE Phase I Report was taken from a 1996 Archives Search Report that also included the Skeet Range located north of the Pistol and Machine Gun Range. This Skeet Range is FUDS project number C02NJ097705 and was removed from the Air Force MMRP. There is no indication of overlap of the two ranges. The specific acreage for the Pistol and Machine Gun Range (SR891) was reported as "unknown" in the CSE Phase I Report and according to NGB/A7OR, the Report to Congress errantly reflected a size of 8.5 acres for the Pistol and Machine Gun Range (SR891).

2.6.1.1 On-Site and Off-Site Data Repositories

Data were collected and investigated from repositories at the national, regional, and local levels to establish the operational history for the MRAs as well as identify any previously unknown MRAs. Sources that provided relevant information included, but were not limited to, manuals, testing records, correspondence, real estate documents, historical aerial and ground-level photographs, maps, drawings, unit histories, and a variety of reports concerning historical activities at Atlantic City IAP AGS and its precursors. Off-site collection activities included, but were not limited to searches of the USAF Historical Research Agency, Defense Technical Information Center, USAF Safety Center, and respective USACE district offices, as well as National Archives and Records Administration facilities. Internet searches were used to supplement data repositories.

2.6.1.2 Personal Interviews

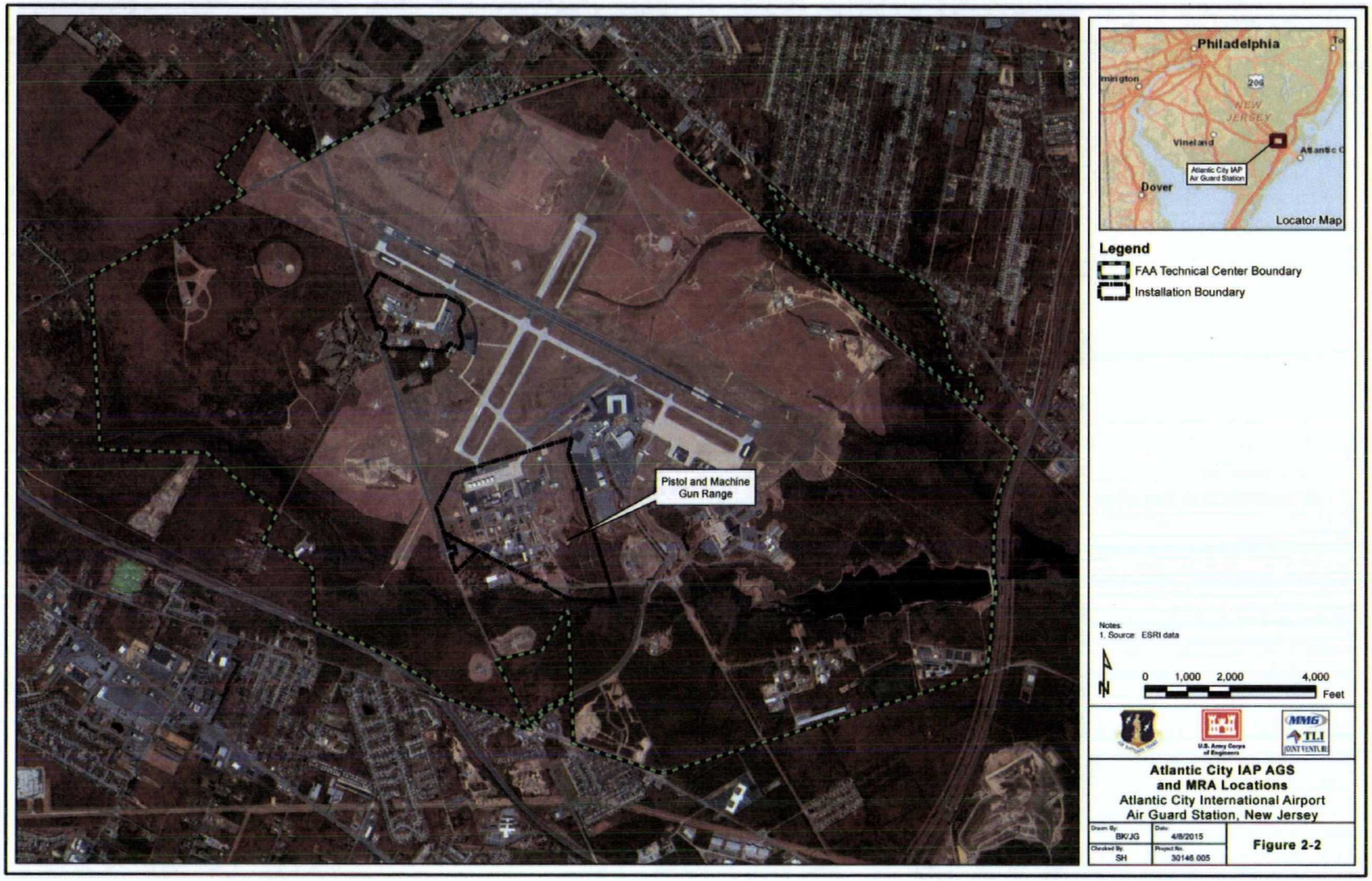
Interviews of on- and off-site personnel were conducted as necessary to validate and/or supplement written documentation. Interviews included a standard set of interview questions, documentation of relevant information about each interviewee, their responses, and any supplemental information provided by the interviewee.

Interviews were conducted with the following for the CSE Phase I report:

- Major Richard DeFeo, 177 Fighter Wing, Atlantic City AGS
- Technical Sergeant Ed Nickel, 177 Fighter Wing, Atlantic City AGS
- Senior Master Sergeant Mike Wachter, 177 Fighter Wing, Safety Office, Atlantic City AGS
- Rose Borsellino, U.S. Forest Service / Fire Service
- Mike Cicali, URS-Federal Aviation Administration
- Bill Fuetterer, TASC Inc.-Federal Aviation Administration
- John Wimberg, Pilot

2.6.1.3 Visual Surveys

Visual surveys of the MRAs were completed for the CSE Phase I report to document any physical evidence to support the data collected during the records research and personnel interviews. Data collected included photographs of any evidence supporting the range-related activities such as target debris, munitions debris, cratering, depressions associated with suspected burial sites, distressed vegetation, berms, and firing points, as well as global positioning system (GPS) coordinates of items photographed. All geo-referenced data were collected in a format compatible with the installation's geographic information system (GIS) using the North American Datum of 1983 (NAD83).


Philadelphia
Vineland
Dover
Atlantic City IAP Air Guard Station
Locator Map
Legend
FAA Technical Center Boundary
Installation Boundary
Pistol and Machine Gun Range
Notes:
1. Source: ESRI data
0 1,000 2,000 4,000 Feet
Atlantic City IAP AGS
and MRA Locations
Atlantic City International Airport
Air Guard Station, New Jersey
Drawn By: BK/JG
Date: 4/8/2015
Checked By: SH
Project No. 30146.005
Figure 2-2

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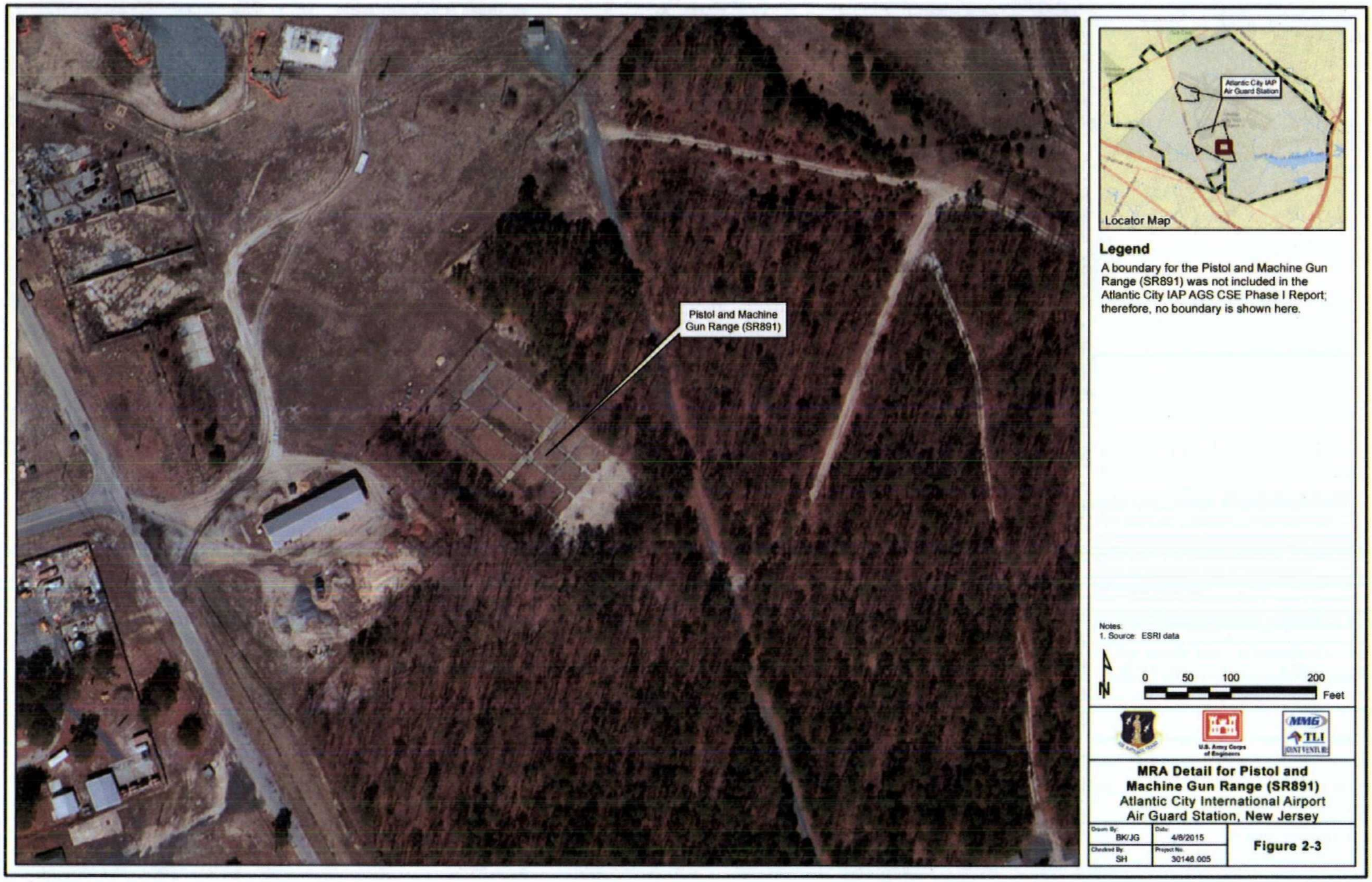
Pistol and Machine Gun Range (SR891)
Atlantic City IAP Air Guard Station
Locator Map
Legend
A boundary for the Pistol and Machine Gun Range (SR891) was not included in the Atlantic City IAP AGS CSE Phase I Report; therefore, no boundary is shown here.
Notes:
1. Source: ESRI data
0 50 100 200
Feet
MRA Detail for Pistol and Machine Gun Range (SR891)
Atlantic City International Airport Air Guard Station, New Jersey
Drawn By: BK/JG
Date: 4/8/2015
Checked By: SH
Project No: 30146.005
Figure 2-3

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Section 3

This section discusses the physical and environmental setting of Atlantic City IAP AGS.

3.1 CLIMATE

The climate at Atlantic City IAP AGS is consistent with a moist continental mid-latitude climate. This type of climate is characterized by warm to cool summers and cold winters. Winters in the region are potentially severe with heavy snowstorms, strong winds and extreme cold from continental polar or arctic air masses. Average temperatures range from a low of 21.4° Fahrenheit (°F) in January to 64.8° F in July. Average wind velocities range between 7.9 to 11.5 miles per hour.

The average annual precipitation at Atlantic City IAP AGS is approximately 40.3 inches and is fairly uniform throughout the year. Average annual monthly ranges from virtually 0.0 inches through the summer and early fall, to 5.3 inches in February.

3.2 TOPOGRAPHY

Atlantic City IAP AGS is located in the Outer Coastal Plain in southeast New Jersey. The surrounding area is characterized by relatively flat terrain, with a maximum elevation of 391 feet at Crawford Hill, New Jersey. This province is separated from the inner coastal plain by a low ridge that is marked by several hills including: Beacon Hill, Arney's Mount, Mount Holy, and Mullica Hill. The elevation at Atlantic City IAP AGS is approximately 75 feet above mean sea level.

3.3 HYDROLOGY

Atlantic City IAP AGS lies within the Egg Harbor Township Watershed Management Area, which includes all watersheds draining into Great Egg Harbor Bay in Atlantic County. This area encompasses waters draining eastern Gloucester and Camden Counties. Watersheds within this area include: the Great Egg Harbor River, the Tuckahoe River, Absecon Creek, and Patong Creek.

The Great Egg Harbor River is 49 miles long and drains an area of 304 square miles. It originates in eastern Gloucester and Camden Counties, an agricultural and suburban area, before flowing through the Pinelands region. The river drains into Great Egg Harbor Bay before emptying into the Atlantic Ocean. The river is tidal downstream of the dam at Mays Landing.

The major tributaries are Hospitality Branch, Watering Race, Babcock Creek, Deep Run, South River and Stephens Creek. There are many lakes and ponds in this area, but the largest is Lake Lenape, near Mays Landing. Waters in the Great Egg Harbor watershed are classified fresh water-2 Non-trout, Pinelands Waters, and fresh water-1.

Drainages flow southeasterly and consist of the North and South Branches of the Absecon Creek. The North Branch is an active perennial drainage in the eastern half of the Atlantic City IAP AGS, but the South Branch has been excessively modified.

3.4 SOIL AND VEGETATION TYPES

3.4.1 Soil Types

Mapped soils beneath Atlantic City IAP AGS consist of the following:

- Aura – The aura series consists of nearly level or gently sloping, well-drained, loamy soils that have firm gravelly sandy clay loam in the lower part of the sub-soil. These soils are on the highest hilltops and divides in the landscape. Permeability is moderately slow or moderate. The seasonal high water table is at a depth of more than 5 feet.
- Downer – The Downer series consists of well-drained, nearly level to gently sloping, sandy or loamy soils. These soils occupy high positions on the landscape. Permeability is moderate or moderately rapid. These soils have a moderate available water capacity, and display a seasonal high water table of 4 feet or below.
- Evesboro – The Evesboro series consists of nearly level or gently sloping, excessively drained, loose, sandy soils. These soils occupy high positions on the landscape. Permeability is rapid in the solum but ranges from moderately rapid to slow in the substratum. The soils have low available water capacity. The seasonal high water table is at a depth of 5 feet or below.
- Fort Mott – The Fort Mott series consists of well-drained, nearly level, or gently sloping soils that have a thick, sandy surface layer and a finer textured subsoil. They occupy high positions on the landscape. Permeability is moderate or moderately rapid. The soils have moderate available water, though it is low in the top 25 inches of the profile. The soils have a water table at a depth of 5 feet or more.
- Hammonton – The Hammonton series consists of nearly level, moderately well drained and somewhat poorly drained soils. Most of these soils are moderately well drained. They are in depressional areas and on broad flats and occupy intermediate positions on the landscape. Permeability generally is moderate or moderately rapid, but it is slow in those soils that have a clayey substratum. These soils have moderate available water capacity. The water table, however, provides additional water for plants. Soils have a seasonal high water table of 1.5 to 4 feet.
- Lakehurst – Lakehurst series soils are nearly level, moderately well drained and somewhat poorly drained sandy soils that have a bleached subsurface layer. These soils occupy intermediate positions and depressional areas on the landscape. They are characterized by rapid permeability, with low water capacity. Water table ranges from a high of 1 feet in depth in January and a low of 6 feet or more in July and August.
- Sassafras – Soils from the Sassafras series are nearly level and gently sloping, well drained, loamy soils. They are found at high positions on the landscape. They have medium fertility and moderate content of organic matter. Soils have moderate permeability and high water capacity. The seasonal high water table is at a depth of 5 feet.
- Woodstown – The Woodstown series consists of nearly level, moderately well drained loamy soils. They occupy intermediate positions on the landscape, and tend to receive surface run off from higher slopes. Permeability is moderate with a seasonal high water table of 1.5 to 4 feet.

- Atsion – The Atsion series consists of nearly level, poorly drained, sandy soils that have a prominent, organically stained subsoil. These soils are on broad flats, in depressional areas, and in narrow drainage ways. They occupy low positions on the landscape. Permeability is moderately rapid or rapid. The soils have a seasonal high water table at a depth of 0 to 1 foot, and are saturated in some areas for 6-8 months of the year.

3.4.2 Vegetation Types

Natural vegetation in the area throughout Atlantic City IAP AGS varies with moisture and elevation. In the dry uplands, vegetation consists of pitch pine and scrub oak with an understory of blueberry and huckleberry. In the lowlands, red maple and tupelo trees dominate, with blueberry, sweetbay, magnolia, holly, sweet pepperbush and swamp azaleas fill in along the waterways (FPM/URS 2012).

3.5 GEOLOGY AND HYDROGEOLOGY

This section discusses the geology and hydrogeology of at Atlantic City IAP AGS.

3.5.1 Geology

The New Jersey Coastal Plain is underlain by a wedge shaped mass of unconsolidated sediments composed of clay, silt, sand and gravel. The wedge thins to a featheredge along the Fall Line and attains a thickness of over six-thousand feet (6,000') at the tip of Cape May County, New Jersey. These sediments range in age from Cretaceous to Holocene and can be classified as continental, coastal or marine deposits. The Cretaceous and Tertiary age sediments generally strike on a northeast-southwest direction and dip gently to the southeast from ten to sixty feet (10 - 60') per mile. The overlying Quaternary deposits, where present, are basically flat lying.

The unconsolidated Coastal Plain deposits, are unconformably underlain by a Pre-Cretaceous basement bedrock complex, which consists primarily of Precambrian and early Paleozoic age rocks. Locally, along the Fall Line in Mercer and Middlesex Counties, the unconsolidated sediments are unconformably underlain by Triassic age rocks (FPM/URS 2012).

3.5.2 Hydrogeology

Two main aquifers are located within close proximity to Atlantic City IAP AGS: the Kirkwood-Cohansey aquifer and the lower "800 foot" sand aquifer of the Kirkwood Formation. The Kirkwood "800 foot" sand aquifer is the principal artesian aquifer of the Kirkwood Formation, extending along the Atlantic Coast from Cape May to Barnegat Light and some distance inland. In Cape May and Cumberland Counties, the upper artesian aquifer of the Kirkwood Formation is defined as the Rio Grande water bearing zone. This aquifer is productive only locally in Cape May County. Along the coast north of Barnegat Light and inland from the coast in Ocean, Burlington, Atlantic, and the western part of Cumberland Counties, the sands of the upper part of the Kirkwood Formation are hydraulically connected to the overlying Cohansey Sand. The Cohansey Sand is typically light colored quartzose sand with lenses of silt and clay. The Cohansey Sand is exposed throughout most of the outer part of the Coastal Plain and attains a maximum thickness of about two hundred fifty feet (250'). Groundwater in the Cohansey aquifer occurs generally under water table conditions except Cape May County, where the aquifer is confined. Inland from the coast and in the northern part of Ocean County, the upper part of the Kirkwood Formation is in hydraulic connection with the Cohansey Sand and they act as a single aquifer (FPM/URS 2012).

The water table located within the FAA controlled property ranges from 3 to 23 feet below the ground surface within the unconfined Upper Cohansey Sand. The existence of isolated layers of clay or clayey silt within the Upper Cohansey Sand appears to perch the water table in some localized instances. Locally, the FAA has several production wells that draw water from the confined Kirkwood-Cohansey aquifer to provide drinking water to the FAA Center, the AGS, and the Atlantic City IAP. The supply wells used for the potable water are approximately 200 feet below ground surface (bgs). Because the water table underlying the installation is thin and unconfined it is not used as a source of drinking water (FPM/URS 2012).

Section 4

This section presents the CSE Phase II investigation scope and approach, including field activities completed (i.e., visual surveys, media sampling and analysis), development of CSE Phase II screening criteria, data QA/QC, and data management. The CSE Phase II field investigation was performed from 8 September – 26 September 2014.

4.1 VISUAL SURVEYS

The MMG-TLI JV team performed a visual survey at the Pistol and Machine Gun Range MRA. The visual survey required team members to look for evidence of munitions-related items throughout the MRA. As discussed in detail in **Section 5.1.6.1**, the only evidence of munitions-related debris was the observation of small arms projectiles (i.e. lead bullets), small arms cartridge cases (i.e., 7mm, 9mm, and 12-guage shotgun), which were observed lying on the surface of the backstop berm and the area immediately in front of the backstop berm. No evidence of other types or larger munitions-related items was observed.

The GPS track-log function of the Trimble GPS unit was used during the visual survey to show transects walked at the Pistol and Machine Gun Range MRA. Transects were spaced approximately 30 feet apart in order to provide high-density visual coverage based on site conditions at the MRA; however, in areas of dense vegetation, transects were spaced closer (i.e., 10 feet apart) to ensure adequate coverage.

In addition to looking for evidence of munitions-related items, the survey team also noted significant topographic features, significant non-munitions debris, vegetation, current land use, site access and roads. These results are discussed in **Section 5.0**. Information acquired during this phase was used to update the RACER (**Appendix L**) and EESOH-MIS (**Appendix M**) data input worksheets.

4.2 GEOPHYSICAL SURVEY

A ground-based digital geophysical survey was not required as part of the CSE Phase II activities at Atlantic City IAP AGS.

4.3 ENVIRONMENTAL MEDIA SAMPLING AND ANALYSIS

The CSE Phase I (FPM/URS 2012) identified surface soil, subsurface soil, and possibly groundwater as potential exposure media. These media were sampled during the CSE Phase II activities to evaluate potential impacts to the media from munitions-related activities at Atlantic City IAP AGS. **Table 4-1** presents the environmental media sampled; XRF field analysis, duplicates, matrix spike/matrix spike duplicate (MS/MSD), and lead correlation samples collected; and analytical parameters analyzed during the CSE Phase II field activities. Sample locations were selected to assess site characteristics, to address the potential for off-site migration of possible contaminants, and to provide data to further evaluate exposure pathways identified in the CSE Phase I Report (FPM/URS 2012). Planned field sample locations were moved away from impenetrable surface features or inaccessible areas. Additional sample locations were analyzed to delineate contamination and to investigate specific areas of interest as determined by field team observations.

One groundwater sample was collected using direct push technology from a new direct push boring, adjacent to the soil sample locations that exhibited the greatest exceedance of the CSE Phase II human health screening criteria, and submitted to the laboratory for dissolved lead analysis.

4.3.1 Soil Sampling Activities

4.3.1.1 XRF Field Analysis for Lead

XRF field analysis was completed on surface and subsurface soil samples collected from the Pistol and Machine Gun Range (SR891) to evaluate and define the nature and extent of lead contamination within this former range. The XRF sample locations are shown on **Figure 4-1**.

Prior to sample collection, vegetation, rocks, and other debris were removed from the ground surface at each sample location. Soil was collected using disposable scoops. Sufficient soil was collected from 6-inch deep intervals and placed in a 1-quart plastic zipper-lock bag. The contents of the bag were mixed well, rocks and other debris were removed, and large clumps were broken apart. Lead projectiles, small arms casings, and/or lead pellets were removed from several samples (these were noted on the XRF Field Analysis Sample Collection Field Sheets). After the soil sample was homogenized, the bag was flattened and ready for XRF analysis.

XRF field analysis was completed using the Innov-X Alpha Series, Model 4000-S XRF analyzer. The Innov-X Alpha 4000-S XRF analyzer typically provides sensitivity in the 10 to 20 parts per million (ppm) range, which is sufficient to meet DQOs for CSE Phase II activities. Prior to XRF analysis, the XRF analyzer was initialized and underwent calibration verification. Standardization was required every time the XRF instrument was initiated or restarted and after every four hours of use. A stainless steel standardization clip was snapped onto the front of the instrument before initiating standardization. As standardization progressed, a spectrum of the standard was collected and compared to values stored in the instrument during factory calibration.

Calibration verification was completed with standards from the National Institute of Standards and Technology (NIST). The NIST standards included a high lead concentration (Standard Reference Material [SRM] 2710a with 5,520 ± 30 ppm lead), a lead concentration to test the XRF sensitivity (SRM 2709a with 17.3 ± 0.1 ppm lead), and a silicon dioxide blank (0 ppm lead). The soil samples were each read at three different positions on the bag at 45-second intervals using the XRF analyzer. The XRF analysis was deemed acceptable for samples greater than 50 ppm if the percent relative standard deviation (%RSD) was less than 20 for the triplicate readings. When the average lead result was above 50 ppm and the %RSD was greater than 20, the sample was re-homogenized and the sample was analyzed again in triplicate. If the average lead result was less than 50 ppm, a %RSD of 50 was used as the decision criteria.

TABLE 4-1
SUMMARY OF SAMPLES COLLECTED DURING THE CSE PHASE II FIELD ACTIVITIES

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
Pistol and Machine Gun Range (SR891)						
SR891-EX001-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX002-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX003-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX004-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX005-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX006-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX007-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX008-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX009-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX010-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX011-SS-0.5	09/12/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX012-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX013-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX014-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX014-SB-1.0	09/15/2014	1.0	Soil	x	x	Correlation Sample
SR891-EX015-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX015-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX015-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX016-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX016-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX016-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX017-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX017-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX017-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX018-SS-0.5	09/16/2014	0.5	Soil		x	
SR891-EX018-SB-1.0	09/16/2014	1.0	Soil	x	x	Correlation Sample
SR891-EX018-SB-1.5	09/16/2014	1.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX018-SB-2.0	09/16/2014	2.0	Soil		x	
SR891-EX019-SS-0.5	09/16/2014	0.5	Soil		x	
SR891-EX019-SB-1.0	09/16/2014	1.0	Soil		x	
SR891-EX019-SB-1.5	09/16/2014	1.5	Soil		x	
SR891-EX019-SB-2.0	09/16/2014	2.0	Soil		x	
SR891-EX020-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX020-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX020-SB-1.5	09/19/2014	1.5	Soil		x	High %RSD – see footnote
SR891-EX020-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX020-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX021-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX021-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX021-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX021-SB-2.0	09/23/2014	2.0	Soil		x	High %RSD – see footnote
SR891-EX021-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX022-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX022-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX022-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX022-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX022-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX022-SB-3.0	09/24/2014	3.0	Soil		x	
SR891-EX022-SB-3.5	09/24/2014	3.5	Soil		x	
SR891-EX022-SB-4.0	09/24/2014	4.0	Soil		x	
SR891-EX023-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX023-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX024-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX024-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX025-SS-0.5	09/10/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX026-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX026-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX027-SS-0.5	09/10/2014	0.5	Soil	x	x	Correlation Sample

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX027-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX028-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX028-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX028-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX029-SS-0.5	09/10/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX030-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX031-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX031-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX032-SS-0.5	09/09/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX032-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX033-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX034-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX035-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX035-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX036-SS-0.5	09/09/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX036-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX037-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX038-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX038-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX039-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX040-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX041-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX042-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX042-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX043-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX043-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX044-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX044-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX045-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX045-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX046-SS-0.5	09/12/2014	0.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX046-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX046-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX046-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX047-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX047-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX047-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX047-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX048-SS-0.5	09/16/2014	0.5	Soil	x	x	Sampled Horizontally, Correlation Sample, MS/MSD
SR891-EX048-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX048-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX048-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX049-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX049-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX050-SS-0.5	09/11/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX050-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX051-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX051-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX052-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX052-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX053-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX053-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX053-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX053-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX054-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX054-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX054-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX054-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX055-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX055-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX055-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX055-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX056-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX056-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX056-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX056-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX056-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX056-SB-3.0	09/24/2014	3.0	Soil		x	
SR891-EX056-SB-3.5	09/24/2014	3.5	Soil		x	
SR891-EX056-SB-4.0	09/26/2014	4.0	Soil		x	
SR891-EX056-SB-4.5	09/26/2014	4.5	Soil		x	
SR891-EX056-SB-5.0	09/26/2014	5.0	Soil		x	
SR891-EX057-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX057-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX057-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX057-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX058-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX058-SB-1.0	09/17/2014	1.0	Soil		x	High %RSD – see footnote
SR891-EX058-SB-1.5	09/23/2014	1.5	Soil		x	
SR891-EX058-SB-2.0	09/24/2014	2.0	Soil		x	
SR891-EX059-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX059-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX060-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX060-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX061-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX061-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX062-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX062-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX063-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX063-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX064-SS-0.5	09/10/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX064-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX065-SS-0.5	09/10/2014	0.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX066-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX066-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX067-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX068-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX069-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX070-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX071-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX072-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX073-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX074-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX074-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX075-SS-0.5	09/10/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX075-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX076-SS-0.5	09/10/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX076-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX077-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX077-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX078-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX078-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX079-SS-0.5	09/15/2014	0.5	Soil		x	
SR891-EX079-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX079-SB-1.5	09/23/2014	1.5	Soil		x	
SR891-EX080-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX080-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX081-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX081-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX082-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX082-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX083-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX083-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX083-SB-1.5	09/19/2014	1.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX083-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX083-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX084-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX084-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX084-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX084-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX085-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX085-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX085-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX085-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX085-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX086-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX086-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX086-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX086-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX087-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX087-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX087-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX087-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX088-SS-0.5	09/16/2014	0.5	Soil	x	x	Sampled Horizontally, Correlation Sample
SR891-EX088-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX088-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX088-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX089-SS-0.5	09/11/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX089-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX090-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX090-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX091-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX091-SB-1.0	09/15/2014	1.0	Soil		x	
SR891-EX092-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX092-SB-1.0	09/15/2014	1.0	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX093-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX093-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX093-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX093-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX094-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX094-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX094-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally, High %RSD – see footnote
SR891-EX094-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX095-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX095-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX095-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX095-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX096-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX096-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX096-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX096-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX096-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX096-SB-3.0	09/24/2014	3.0	Soil		x	
SR891-EX096-SB-3.5	09/26/2014	3.5	Soil		x	
SR891-EX096-SB-4.0	09/26/2014	4.0	Soil		x	
SR891-EX096-SB-4.5	09/26/2014	4.5	Soil		x	
SR891-EX096-SB-5.0	09/26/2014	5.0	Soil		x	
SR891-EX096-SB-5.5	09/26/2014	5.5	Soil		x	
SR891-EX097-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX097-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX097-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX098-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX098-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX098-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX098-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX098-SB-2.5	09/24/2014	2.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX099-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX099-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX100-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX100-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX101-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX101-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX102-SS-0.5	09/15/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX102-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX103-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX104-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX105-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX106-SS-0.5	09/10/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX106-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX107-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX108-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX109-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX110-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX111-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX112-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX113-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX114-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX115-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX116-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX117-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX118-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX119-SS-0.5	09/15/2014	0.5	Soil	x	x	Correlation Sample
SR891-EX119-SB-1.0	09/18/2014	1.0	Soil		x	
SR891-EX120-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX121-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX121-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX122-SS-0.5	09/12/2014	0.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX122-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX123-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX123-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX123-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX123-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX123-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX123-SB-3.0*	09/24/2014	3.0	Soil			
SR891-EX123-SB-3.5	09/26/2014	3.5	Soil		x	
SR891-EX123-SB-4.0	09/26/2014	4.0	Soil		x	
SR891-EX123-SB-4.5	09/26/2014	4.5	Soil		x	
SR891-EX124-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally
SR891-EX124-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally
SR891-EX124-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX124-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX125-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX125-SB-1.0	09/18/2014	1.0	Soil		x	
SR891-EX126-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX126-SB-1.0	09/18/2014	1.0	Soil		x	
SR891-EX127-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX128-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX128-SB-1.0	09/18/2014	1.0	Soil		x	
SR891-EX129-SS-0.5	09/16/2014	0.5	Soil		x	Sampled Horizontally, High %RSD – see footnote
SR891-EX129-SB-1.0	09/16/2014	1.0	Soil		x	Sampled Horizontally, High %RSD – see footnote
SR891-EX129-SB-1.5	09/16/2014	1.5	Soil		x	Sampled Horizontally
SR891-EX129-SB-2.0	09/16/2014	2.0	Soil		x	Sampled Horizontally
SR891-EX130-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX130-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX130-SB-1.5	09/19/2014	1.5	Soil		x	
SR891-EX130-SB-2.0	09/23/2014	2.0	Soil		x	
SR891-EX130-SB-2.5	09/24/2014	2.5	Soil		x	
SR891-EX130-SB-3.0	09/24/2014	3.0	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX130-SB-3.5	09/26/2014	3.5	Soil		x	
SR891-EX131-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX131-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX132-SS-0.5	09/12/2014	0.5	Soil		x	
SR891-EX132-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX133-SS-0.5	09/15/2014	0.5	Soil		x	
SR891-EX134-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX135-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX135-SB-1.0	09/23/2014	1.0	Soil		x	
SR891-EX136-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX137-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX138-SS-0.5	09/10/2014	0.5	Soil		x	
SR891-EX139-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX140-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX141-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX142-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX143-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX144-SS-0.5	09/09/2014	0.5	Soil		x	
SR891-EX145-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX146-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX147-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX148-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX149-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX150-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX151-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX152-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX153-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX154-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX155-SS-0.5	09/11/2014	0.5	Soil		x	
SR891-EX155-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX156-SS-0.5	09/11/2014	0.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX156-SB-1.0	09/17/2014	1.0	Soil		x	
SR891-EX157-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX158-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX159-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX160-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX160-SB-1.0	09/23/2014	1.0	Soil		x	
SR891-EX161-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX161-SB-1.0	09/23/2014	1.0	Soil		x	
SR891-EX162-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX163-SS-0.5	09/18/2014	0.5	Soil		x	High %RSD – see footnote
SR891-EX163-SB-1.0	09/23/2014	1.0	Soil		x	
SR891-EX164-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX164-SB-1.0	09/23/2014	1.0	Soil		x	
SR891-EX165-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX165-SB-1.0	09/23/2014	1.0	Soil		x	
SR891-EX166-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX167-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX168-SS-0.5	09/18/2014	0.5	Soil		x	
SR891-EX169-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX169-SB-1.0	09/24/2014	1.0	Soil		x	
SR891-EX170-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX170-SB-1.0	09/24/2014	1.0	Soil		x	
SR891-EX171-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX172-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX172-SB-1.0	09/24/2014	1.0	Soil		x	
SR891-EX173-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX173-SB-1.0	09/24/2014	1.0	Soil		x	
SR891-EX174-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX175-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX176-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX177-SS-0.5	09/23/2014	0.5	Soil		x	

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	Media Type	Analytical Parameters		Comments
				Lead [1]	XRF Lead [2]	
SR891-EX178-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX179-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX180-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX181-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX182-SS-0.5	09/23/2014	0.5	Soil		x	
SR891-EX300-SS-0.5	09/19/2014	0.5	Soil	x		Correlation sample duplicate
Background						
SR891-BG01-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG02-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG03-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG04-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG05-SS-0.5	9/11/2014	0.5	Soil	x		MS/MSD
SR891-BG06-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG07-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG08-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG09-SS-0.5	9/11/2014	0.5	Soil	x		
SR891-BG10-SS-0.5	9/11/2014	0.5	Soil	x		
Groundwater						
SR891-GW01	09/18/2014	15	Ground water	x		
SR891-GW02	09/18/2014	15	Ground water	x		Duplicate of GW01
Investigation-Derived Waste						
SR891-WCS01	9/26/2014	NA	Soil	x [3]		Composite of soil samples
SR891-WCW01	9/26/2014	NA	Water	x [3]		Decontamination water

Notes:

[1] Lead only - Analytical Method USEPA SW-846 6010B Lead Only/Preparation Method 3050B

[2] Soil samples were collected and analyzed with ex-situ XRF technology

[3] Toxicity Characteristic Leaching Procedure USEPA Method 1311

*This sample location encountered refusal at 27-inches bgs. A new boring was started adjacent to this location but the team failed to recollect the 3.0 interval.

High %RSD - Samples noted with High %RSD were locations where the XRF field analysis resulted in a >20% RSD, even after several analysis attempts. Further analysis attempts were abandoned because the initial attempts resulted in lead concentrations significantly higher than 200 mg/kg (field screening value) and/or the next sample interval was going to be collected anyway, as presented in **Table 4-1** and **Table 5-1**.

bgs = below ground surface
BG = Background
CSE = Comprehensive Site Evaluation
EX = Ex-situ Sample
GW = Groundwater
MS/MSD = Matrix spike/matrix spike duplicate
NA = Not applicable
SB = Subsurface sample
SR891 = Pistol and Machine Gun Range (SR891)
SS = surface soil sample
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Properties, Final Update IVb
USEPA = United States Environmental Protection Agency
XRF = X-ray fluorescence
WCS = Waste Characterization Soil
WCW = Waste Characterization Water

For any soil sample, if the XRF results were greater than one-half the lead field screening level (i.e., 200 ppm, given the 400 milligrams per kilogram (mg/kg) screening level [ppm equals mg/kg]), then additional soil samples were collected below it at 6-inch intervals until the XRF results were less than one-half the field screening value. In addition, the lateral extent of contamination was defined by testing samples approximately 25 feet or less north, south, east, and west of any sample location with a XRF result greater than the 200-ppm field screening level.

Soil samples from the face of the main backstop berm were collected horizontally, rather than vertically, to delineate potential lead contamination inside the backstop berm. These fifteen sample locations were also collected in 6-inch intervals, and to a horizontal depth of 2-ft. These locations are noted in the comments column of **Table 4-1** with "*Sampled Horizontally*". None of these locations exceeded the field screening level beyond the 1-ft horizontal depth interval, and only three exceeded the field screening level beyond the 6-inch depth interval as presented in **Table 4-1**.

Selected samples were sent to the laboratory for lead correlation analysis. A total of 20 correlation samples (18 plus a duplicate and MS/MSD) analyzed on-site for lead using the XRF analyzer were also sent to an off-site laboratory for lead analysis following U.S. Environmental Protection Agency (USEPA) Method 6010B. The correlation samples were comprised of samples with XRF results that were low, but near the field delineation value of 200 mg/kg, and near the human health screening level of 400 mg/kg. The results from the off-site laboratory were used to determine a correlation between the XRF field analyses and off-site laboratory analyses. The correlation samples were chosen from samples collected at 0.5 foot to 1.0 feet bgs from the MRA (**Table 4-1**).

XRF triplicate readings met the %RSD acceptance criteria for all but seven analysis runs. Several attempts were made for these seven to achieve acceptable %RSD but then further analysis attempts were abandoned. It was deemed not significant since these seven would need additional sample intervals collected below them because the XRF analysis results for these seven were greater than the field delineation value of 200 mg/kg. The affected sample locations were:

SR891-EX020-SB-1.5
SR891-EX021-SB-2.0
SR891-EX058-SB-1.0
SR891-EX094-SB-1.5
SR891-EX129-SS-0.5
SR891-EX129-SB-1.0
SR891-EX163-SS-0.5

In addition, the daily XRF standardizations and NIST SRMs were within acceptance criteria.

The correlation coefficient (r) between the XRF and off-site laboratory analyses was 0.9366 for the Pistol and Machine Gun Range (SR891) (**Table 4-2**), showing a positive linear relationship. The XRF data were used in the risk screening process (**Section 9**).

4.3.1.2 Laboratory Analysis for PAH

In accordance with the Final Atlantic City IAP AGS ANGB CSE Phase II WP (MMG-TLI JV 2014), soil samples for polycyclic aromatic hydrocarbons (PAH) analysis were not collected. However, during the visual survey, a small amount of clay target debris was observed on the surface of the backstop berm. No other evidence was observed that would indicate extensive use of clay targets on the range.

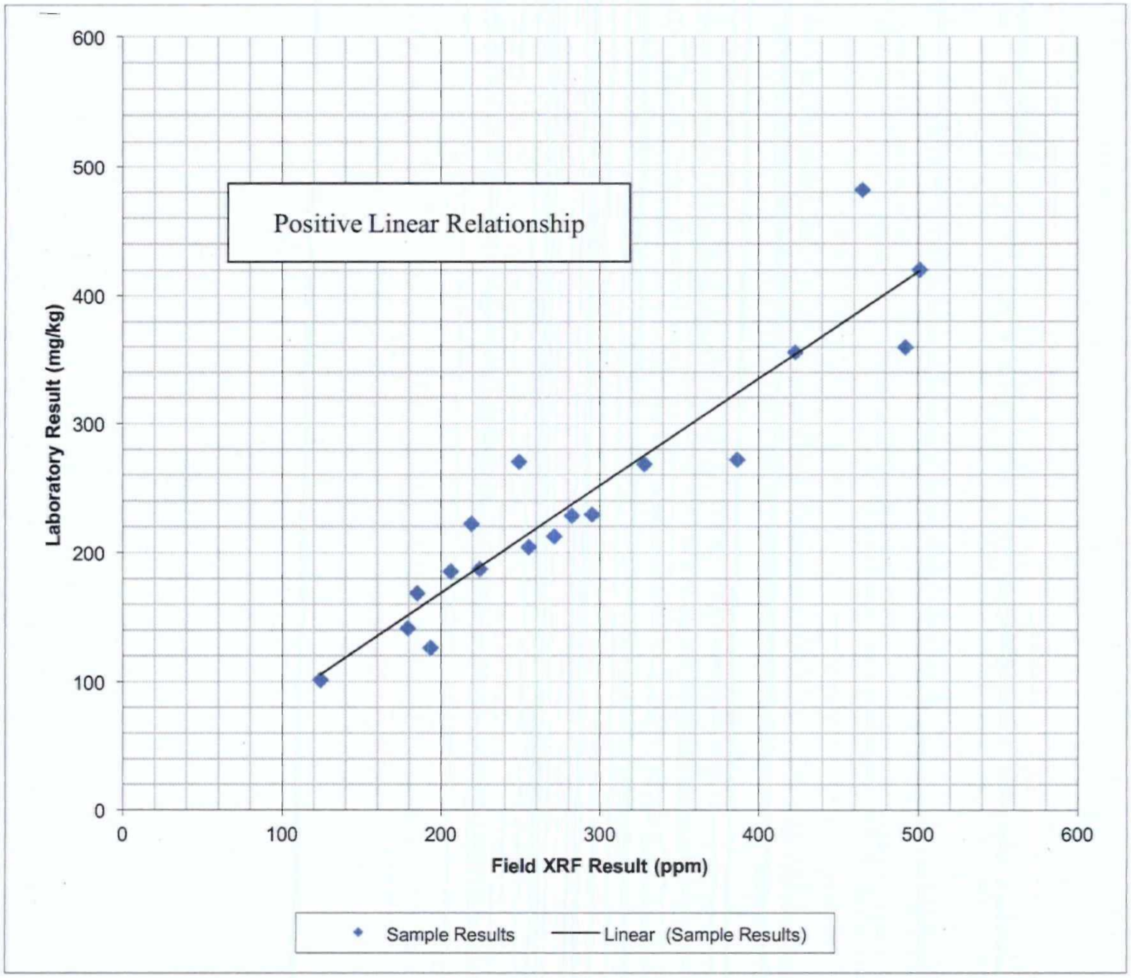
TABLE 4-2
PISTOL AND MACHINE GUN RANGE (SR891)
LEAD XRF AND LABORATORY CORRELATION RESULTS

Sample Identification	Sample Depth (feet bgs)	Lead by XRF[1] (ppm)	Lead by USEPA SW-846 6010B (mg/kg)
SR891-EX011-SS-0.5	0.5	193	126
SR891-EX014-SS-0.5	0.5	271	212
SR891-EX025-SS-0.5	0.5	124	101
SR891-EX027-SS-0.5	0.5	249	270
SR891-EX029-SS-0.5	0.5	179	141
SR891-EX032-SS-0.5	0.5	501	420
SR891-EX036-SS-0.5	0.5	206	185
SR891-EX048-SS-0.5	0.5	185	168
SR891-EX050-SS-0.5	0.5	224	187
SR891-EX064-SS-0.5	0.5	423	356
SR891-EX075-SS-0.5	0.5	492	360
SR891-EX076-SS-0.5	0.5	386	272
SR891-EX088-SS-0.5	0.5	219	222
SR891-EX089-SS-0.5	0.5	465	482
SR891-EX102-SS-0.5	0.5	295	229
SR891-EX106-SS-0.5	0.5	328	268
SR891-EX119-SS-0.5	0.5	282	228
SR891-EX018-SB-1.0	1.0	255	204

Notes:

[1]The concentration unit ppm and mg/kg are comparable.
bgs = below ground surface
EX = Ex-situ sample
mg/kg = milligrams per kilogram
ppm = parts per million
SR891 = Pistol and Machine Gun Range (SR891)
SB = Subsurface sample
SS = Surface soil sample
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Properties, Final Update IVb
USEPA = United States Environmental Protection Agency
XRF = X-ray fluorescence

TABLE 4-2 (continued)
PISTOL AND MACHINE GUN RANGE (SR891)
LEAD XRF AND LABORATORY CORRELATION RESULTS



r = 0.936

4.3.2 Groundwater Sampling Activities

In order to address potential migration of lead from soil to groundwater, lead concentrations in soil were compared to USEPA's soil screening level for the protection of groundwater of 14 mg/kg. This level is presented in USEPA's May 2012 version of the Regional Screening Level (RSL) Table and is back calculated from the maximum contaminant level of 15 ug/L and conservatively assumes a default dilution attenuation factor of 1. This value was exceeded and lead in soil was found to be above background levels, so one groundwater sample was collected via direct push near the locations with the most elevated lead-in-soil concentrations. The groundwater sample was submitted to the laboratory for dissolved lead analysis. The groundwater sample was field filtered and will be used to help characterize groundwater conditions at this MRA. The summary of groundwater samples collected is presented in **Table 4-1** above. The groundwater sample location is shown on **Figure 4-1**.

4.4 CSE PHASE II SCREENING CRITERIA

Analytical data generated during the CSE Phase II at Atlantic City IAP AGS were compared to risk screening and background levels to determine if contaminant releases have occurred at concentrations exceeding levels (i.e., human health and ecological) of potential concern. Screening levels are defined as a level of contamination above which there may be concern to warrant a site-specific study of risk. The screening criteria used at Atlantic City IAP AGS are discussed below and presented in **Table 4-3**. Background levels used for screening lead at Atlantic City IAP AGS are presented in **Table 4-4**.

4.4.1 Human Health Screening Levels

Screening values for the human health risk evaluation were as follows:

- Surface and subsurface soil – USEPA RSLs for Resident Soil (USEPA 2013).
- Groundwater – New Jersey Department of Environmental Protection (NJDEP) Ground Water Quality Standards, N.J.A.C. 7:9C (NJDEP 2014).

Values exceeding the screening levels were additionally compared to Atlantic City IAP AGS background levels (**Section 4.4.3**). **Table 4-3** presents the human health screening levels used at Atlantic City IAP AGS.

TABLE 4-3
HUMAN HEALTH SCREENING LEVELS

Parameter/Analyte	Soil (mg/kg)			Water (Groundwater) (µg/L)	
	Residential Soil Human Health Screening Levels	Soil Screening Level for the Protection of Groundwater (mg/kg)	Source	Groundwater Human Health Screening Level (µg/L)	Source
Lead USEPA Method 6010B					
Lead	400	14	USEPA[1]	5	NJDEP[2]

Notes:

[1] USEPA, Regional Screening Levels (USEPA 2012)

[2] NJDEP, N.J.A.C. 7:9C, Ground Water Quality Standards (NJDEP 2014)

µg/L = micrograms per liter
mg/kg = milligrams per kilogram
NJDEP = New Jersey Department of Environmental Protection
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
USEPA = United States Environmental Protection Agency

TABLE 4-4
SAMPLE MEDIA BACKGROUND LEVELS

Chemical	Surface Soil[1] (mg/kg)
Lead	
Lead	18.71

Notes:

[1] Lead calculated with ProUCL (USEPA 2011) using 11 surface soil samples located outside of the Atlantic City IAP AGS MRA. This value represents the 95 percent UTL.

AGS = Air Guard Station

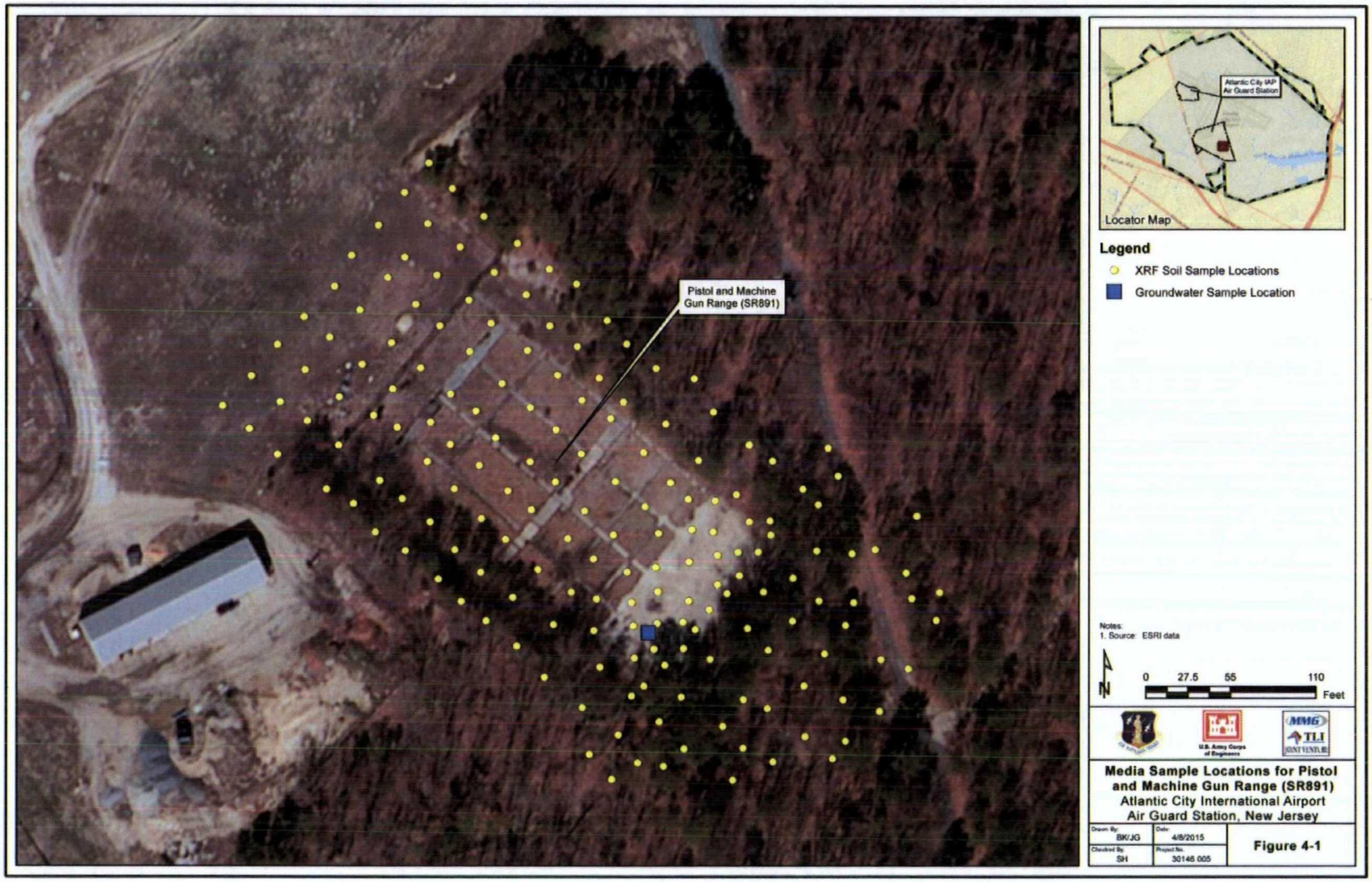
IAP = International Airport

mg/kg = milligrams per kilogram

MRA = munitions response area

USEPA = United States Environmental Protection Agency

UTL = upper tolerance limit



Media Sample Locations for Pistol and Machine Gun Range (SR891)
Atlantic City International Airport
Air Guard Station, New Jersey

Figure 4-1

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4.4.2 Ecological Screening Levels

For ecological screening, chemicals with detected concentrations above the selected screening level will be identified as contaminants of potential ecological concern (COPECs) warranting further evaluation. The sources and hierarchy of selection of the ecological screening levels are as follows:

- Background Data (CSE Phase II).
- Surface Soil – USEPA, Ecological Soil Screening Level (EcoSSL), 2005.

If ecological screening values are exceeded, lead concentrations will be further evaluated by comparing with site-specific background data using the same approach described for the human health evaluation. If the exposure concentration for lead is equal to or less than the screening value, it will be concluded that lead does not pose unacceptable risks to ecological receptors. If lead is found to be above both ecological screening levels and background, further risk screening evaluation may be conducted to develop recommendations for future response actions, if any.

A chemical-specific list of ecological screening levels is provided in **Table 4-5**.

TABLE 4-5
ECOLOGICAL SCREENING LEVELS

Parameter/Analyte	Soil (mg/kg)		
	Soil Ecological Screening Level (mg/kg)	Soil Screening Level for the Protection of Groundwater (mg/kg)	Source
Lead USEPA Method 6010B			
Lead	11	14	USEPA [1]

Notes:
[1] USEPA, Ecological Soil Screening Level (EcoSSL) (USEPA 2005)
mg/kg = milligrams per kilogram
USEPA = United States Environmental Protection Agency

4.4.3 Background Levels

A background study for lead in surface soil was completed at Atlantic City IAP AGS during the CSE Phase II. Discrete surface soil samples were collected during the CSE Phase II field activities to establish background concentrations. To determine the background levels of lead in surface soil, the 95-percent upper tolerance limits were calculated using ProUCL Version 5.0.00 (USEPA 2013a). This ProUCL software requires a minimum of eight data sets; therefore, eleven discrete background samples were collected for surface soil. The lead concentration range for the background surface soil samples was 7.1 mg/kg to 121 mg/kg. Prior to calculating the background level of lead, an outlier test (Dixon) was completed. It was determined that the highest values (121 mg/kg at location BG-09 and 63.7 mg/kg at BG-01) were outliers, and not included in the data set. The Dixon Outlier Test in ProUCL (USEPA 2013a) determined that these values were outliers at the 1-percent significance level and were not included in the data set to calculate the 95-percent upper tolerance limit for background lead in surface soil. Therefore, the Atlantic City IAP AGS data set for the ProUCL background calculation for lead includes nine samples.

Background concentrations of lead are assumed to be naturally occurring. All discrete background samples collected during the CSE Phase II field activities were submitted to the laboratory for analysis of lead. The background samples were used to determine if lead detections can be attributed to background concentrations or if they are related to MRA activities. Background samples were collected from areas where Atlantic City IAP AGS MRA activities have not occurred. The locations of background samples (shown on **Figure 4-2**) were agreed upon by the team (i.e., ANG, USACE, FAA, Atlantic City IAP AGS, and the MMG-TLI JV Team) prior to collection. The background level for lead in surface soil, calculated at 18.71 mg/kg, is presented in **Table 4-4**. Analytical data and the 95-percent upper tolerance limit calculations are presented in **Appendix J**.

4.5 DATA QUALITY APPROACH

The overall data quality approach for this project was to develop and implement procedures for field and laboratory activities that provide results that will meet the project objectives and are legally defensible. Specific procedures for equipment maintenance and calibration and for sampling were completed in accordance with the SOPs presented in Appendix B of the CSE Phase II WP (MMG-TLI JV 2014). Specific procedures for the chain-of-custody (COC), laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventive maintenance of field equipment, and corrective action are described in the CSE Phase II WP QAPP (MMG-TLI JV 2014). Atlantic City IAP AGS team members were provided a copy of the CSE Phase II WP, which was reviewed prior to the start of field activities.

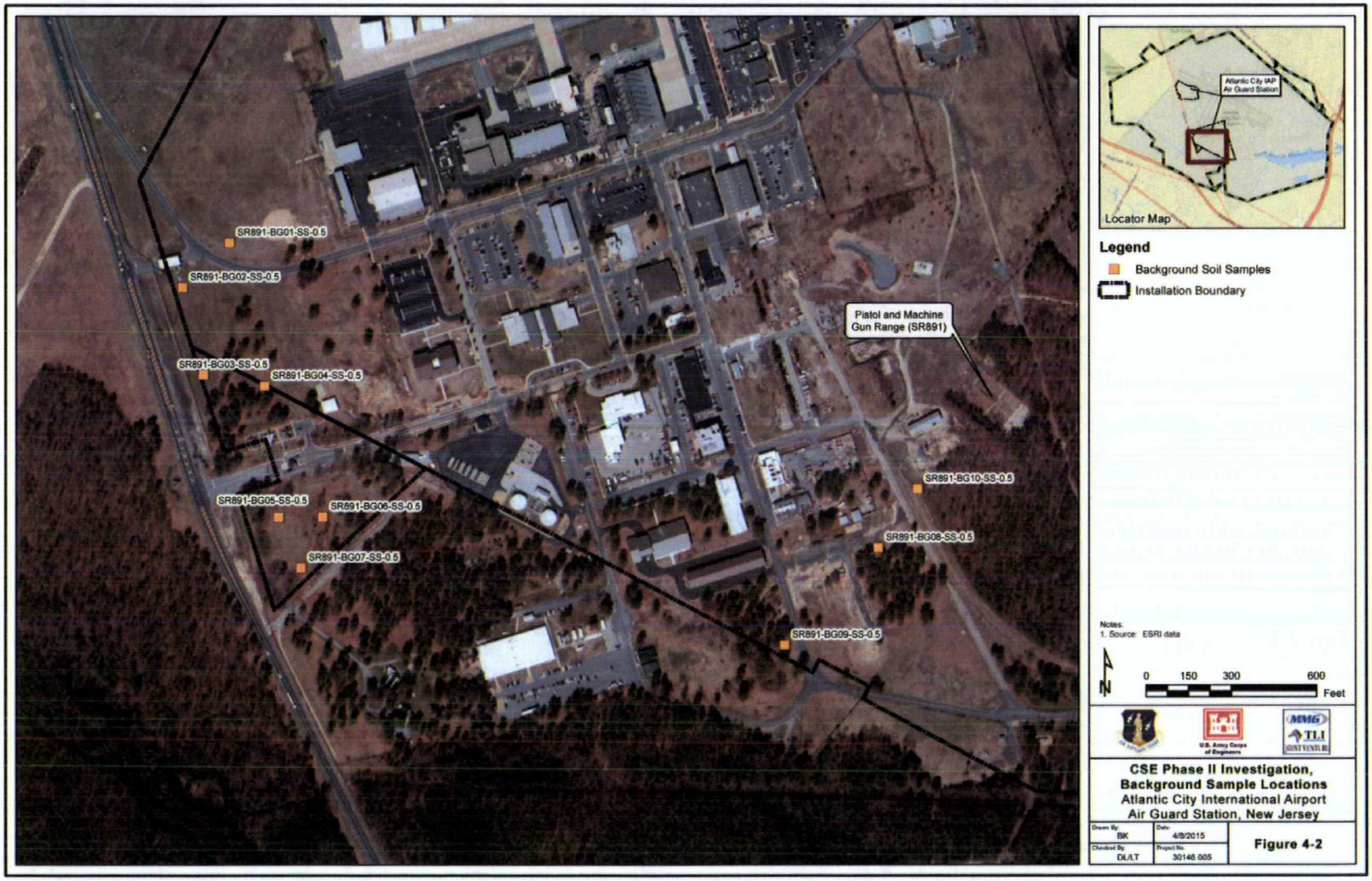
DQOs were developed to ensure the reliability of environmental sampling and field analysis, ensure the collection of sufficient data, ensure that data quality was acceptable for making decisions, and to ensure that valid recommendations could be developed (discussed in **Section 1.2**).

4.5.1 Geophysical Surveying Data Quality Assurance

A ground-based digital geophysical survey was not required as part of the CSE Phase II activities at Atlantic City IAP AGS.

4.5.2 Laboratory Analytical Data Quality Assurance

The usability of data for Atlantic City IAP AGS was determined based on evaluation of the data using precision, accuracy, representativeness, completeness, comparability, and sensitivity parameters.



CSE Phase II Investigation, Background Sample Locations
Atlantic City International Airport Air Guard Station, New Jersey

Figure 4-2

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4.5.2.1 Precision and Accuracy

The agreement between duplicate analyses within control limits indicates satisfactory precision in a measurement system. The recovery of a predetermined amount of a spike within control limits indicates satisfactory accuracy with respect to the method on the individual sample and general matrix. For lead, 100 percent of the indicators reviewed for accuracy (laboratory control sample, MS/MSD and post digestion spikes recoveries) and precision (MS/MSD, laboratory duplicate, and field duplicate relative percent difference [RPDs]) were within evaluation criteria. The overall accuracy and precision of the sample data reported for the Atlantic City IAP AGS CSE Phase II sampling event was concluded to be acceptable.

4.5.2.2 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population. Representativeness is a qualitative parameter that is addressed by the proper design of the sampling program, such that the sampling locations selected will provide representative data for decisions at Atlantic City IAP AGS. Representativeness was assessed by evaluating that the proper sampling and analytical procedures, appropriate methods, laboratory SOPs, holding times, and field duplicate procedures were followed. All detections for lead are representative of site contamination or background concentrations as no results were qualified for blank contamination.

All samples were received in good condition and were properly collected and stored and were analyzed within the specified holding times and to all project and method requirements. Duplicate sample pairs were collected at Atlantic City IAP AGS to assess the effect of sample collection on results. For the lead analyses, 100 percent of the analytes in field duplicate sample pairs met RPD evaluation criteria. Therefore, it was concluded that overall representativeness was acceptable.

4.5.2.3 Comparability

Comparability expresses the confidence with which one data set can be compared to another. In accordance with the QAPP, data are comparable when collection techniques, measurement methods and reporting procedures are equivalent for the samples within a sample set. Throughout this investigation, appropriate procedures for sampling, analysis and shipping were implemented as specified in the Atlantic City IAP AGS CSE Phase II QAPP (MMG-TLI JV 2014) and it was concluded that results were comparable to one another.

4.5.2.4 Completeness

Completeness is defined as the percentage of the total number of analytical results requested which are judged to be usable, including estimated values. In accordance with the Atlantic City IAP AGS CSE Phase II QAPP (MMG-TLI JV 2014) completeness was 100 percent for the lead data.

4.5.2.5 Sensitivity

Sensitivity is defined as the capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest. Sensitivity requirements include the establishment of instrument detection limits (DLs), Limits of Detection (LOD), and limits of quantitation (LOQs). Sensitivity was achieved by the laboratory for lead analysis in soil. Additionally, sensitivity was established and no limitations of the data were noted as the interference check sample and low level calibration verification standards met all criteria. All detected results for lead were at concentrations greater than the LOQ and no qualifiers were added to the data. The results and reporting limits were correctly reported and adjusted for sample size, dilution, and percent moisture, where applicable.

4.5.3 Analytical Methodology

Soil samples were collected during CSE Phase II field activities. XRF confirmation samples were submitted to Agriculture and Priority Pollutants Laboratories (APPL), Inc. for analysis. The laboratory SOPs for sample preparation, cleanup, and analysis are based on USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Final Update IVB, January 2008; DoD Quality Systems Manual; and other applicable methods. Specific laboratory practices for the methods summarized below, including sample preparation, sample tracking, QA/QC, and documentation controls, are provided in the laboratory QAPP (available upon request). Samples sent for laboratory analysis were analyzed using one or more of these methods. The laboratory is DoD Environmental Laboratory Accreditation Program-certified for all applicable analyses performed for Atlantic City IAP AGS.

4.5.3.1 Lead

Samples for lead analysis at the laboratory were prepared by USEPA SW-846 Method 3050B and analyzed for metals following Method 6010B. Method 6010B involves inductively coupled plasma (ICP) emission spectroscopy to measure characteristic emission spectra by optical spectrometry.

4.5.3.2 Data Review

Hard copy analytical data packages from the laboratory consisted of the QC summary. A Portable Document Format (PDF) copy of the QC summary and raw data package were provided. In addition, the laboratory submitted electronic data in Environmental Resources Program Information Management System (ERPIMS) formats. The turnaround time for data (hard copy and electronic) ranged from 14 to 21 calendar days.

The data review process evaluated data against a set of accepted criteria to assess quality and validity and to provide assurance that data were acceptable for their intended use. One hundred percent of the data underwent a second level data review by the MMG-TLI JV Project Chemist. This data review was completed in accordance with the Atlantic City IAP AGS CSE Phase II WP, Appendix I, QAPP (MMG-TLI JV 2014). The data review included review of the QC parameters below:

- COC form
- Cooler receipt form
- Holding time/sample preparation
- Case narrative
- Method blanks
- Reagent/preparation blanks (applicable to inorganic analysis)
- Laboratory control samples
- MS/MSDs and MS/matrix duplicates
- Laboratory duplicates
- Field duplicate samples

4.5.3.3 Data Validation

Approximately 10 percent of the data underwent a data validation by the MMG-TLI JV Project Chemist. This validation was completed in accordance with the Atlantic City IAP AGS CSE Phase II QAPP (MMG-TLI JV 2014). The validation is a more comprehensive examination of the data than the data review. The validation included all of the elements identified in the review; however, the validation also included additional parameter reviews and the recalculation of the raw data. The QC parameters validated included the following:

- Initial calibration
- Calibration verification
- Sample preparation log review
- ICP serial dilutions and post-digestion spikes
- ICP interference check samples
- Run log review
- Sample result recalculation using the raw data

4.6 DATA MANAGEMENT

4.6.1 Electronic Data

The CSE Phase II project data are primarily managed electronically. The associated electronic files are stored on the secure office network at the MMG-TLI JV Golden location. Project team members have limited access to the specific project directory while the document is in development. Once the document is complete and ready for the independent technical review, the files are moved to a directory with restricted access. The MMG-TLI JV Golden network is backed up weekly, and the tapes are stored at an off-premise, secure location. Additionally, the laboratory provides electronic deliverables in an ERPIMS-compatible format for upload at the completion of the project.

4.6.2 Hardcopy Data

All data collected in a hardcopy format (e.g., the as-built facility drawings) were scanned or otherwise entered into a computer and saved in an electronic format.

4.6.3 Geographical Information System Data

Prior to the visual surveys, the team acquired GIS mapping data from previously collected GIS data and current aerial photographs. These data were used to support field-mapping efforts as well as report mapping and analysis efforts. During the visual survey, team members used a Trimble GPS unit with relevant GIS Layers to: 1) orient team members on the site, 2) verify previously discovered information, 3) supplement previously discovered information with current visual information, 4) acquire positional/coordinate data for the MRA, 5) identify and gather any previously undiscovered MRA information, and 6) identify soil sample locations. Location information for site features of interest was acquired in NAD83 Universal Transverse Mercator (UTM) Zone 16, meters.

Section 5

Section 5

This section describes the characteristics of the Pistol and Machine Gun Range (SR891) MRA that was investigated as part of the CSE Phase II activities at Atlantic City IAP AGS.

5.1 PISTOL AND MACHINE GUN RANGE (SR891)

5.1.1 Site Description

The Pistol and Machine Gun Range (SR891) is located in the central portion of the property leased by the NJANG. The Pistol and Machine Gun Range (SR891) was identified as a potential MMRP site during the Historical Records Review of installation maps, aerial photographs, inspection reports, and correspondence documents. Initial use of this range began in the 1940s. The pistol range was reported as being active up until the mid-1990s, while the machine gun portion was reportedly demolished in the 1960s.

It should be noted that a boundary for the Pistol and Machine Gun Range (SR891) was not included in the Atlantic City IAP AGS CSE Phase I Report. Additionally, the 5.4 acres initially reported in the Atlantic City IAP AGS CSE Phase I Report was taken from a 1996 Archives Search Report that included a Skeet Range located north of the Pistol and Machine Gun Range. This Skeet Range is FUDS project number C02NJ097705 and was removed from the Air Force MMRP. There is no indication of overlap of the two ranges. The specific acreage for the Pistol and Machine Gun Range (SR891) was reported as "unknown" in the CSE Phase I Report. Additionally, according to NGB/A7OR, the Report to Congress errantly reflected a size of 8.5 acres for the Pistol and Machine Gun Range (SR891).

During preparation of the CSE Phase II investigation Work Plan, a temporary boundary for the MRS was defined based on existing aerial images of the range. During field investigation activities, the visual survey and soil sampling activities extended beyond this temporary boundary (on all four sides) to ensure the entire range was fully investigated and an actual boundary could be determined.

5.1.2 History of MC-Related Activities

As previously stated, initial use of this range began in the 1940s. The pistol range was reported as being active up until the mid-1990s, while the machine gun portion was reportedly demolished in the 1960s. Munitions used at the Pistol and Machine Gun Range (891) may have included: .22, .30, .32, .38, .45 calibers, 5.56 millimeter (mm), 7.62mm, and 9mm cartridges.

5.1.3 Current Land Use

The Pistol and Machine Gun Range (SR891) is currently undeveloped and appears unchanged from when it was last used.

5.1.4 Access Controls

Atlantic City IAP AGS is fenced on all sides and access is restricted to two gates with guard huts. The portions of the range that remain (berm and firing lanes) are currently fenced and access is limited to employees and qualified visitors.

5.1.5 Restrictions

Coordination with Atlantic City IAP AGS is required to access the Pistol and Machine Gun Range (SR891). No other access restrictions are in place at the Pistol and Machine Gun Range (SR891).

5.1.6 Field Investigation Results

Based on potential munitions-related activities at the Pistol and Machine Gun Range (SR891), the CSE Phase I identified surface soil and subsurface soil as potential exposure media in the ICSM (FPM/URS 2011). Surface soil and subsurface soil were sampled during CSE Phase II field activities at the Pistol and Machine Gun Range (SR891) to evaluate the potential impacts of MC at the MRA. In addition, direct push technology was utilized to obtain a single groundwater sample. The number of environmental samples collected; sample identifiers; and analytical parameters for the Pistol and Machine Gun Range (SR891) are summarized in **Table 4-1**.

The sample locations (**Figure 4-1**) address site characteristics and provide data to further evaluate the exposure pathways identified in the CSE Phase I Report (FPM/URS 2011). The following subsections discuss the visual survey observations and environmental media sampling results.

5.1.6.1 Visual Survey Observations

A visual survey was completed during the course of the field investigation at the Pistol and Machine Gun Range (SR891). The field team walked the entire range footprint in transects spaced at approximately 30-feet apart (10-feet apart in dense vegetation) to visually inspect and search for evidence of munitions-related activities and other significant range features. The visual survey transects and visual survey observations are presented on **Figure 5-1**.

The former range is bounded on three sides by an earthen berm, which forms a U-shape. Direct access to the range floor is through a chain-link fence entrance gate on the open end of the U-shaped berm. The berm itself is populated with older growth trees and underbrush. The range floor is covered in grasses and few small younger growth trees/shrubs. Concrete/paved sidewalks are visible and accessible throughout the range, except at the toe of the backstop berm. The sidewalks here are buried under several inches of sand, which has eroded over the years from the backstop berm.

No visual indication of the former machine gun range (firing lines or targets) was observed during the visual reconnaissance. The former berm/backstop utilized by both the former machine gun range and former pistol range was observed to surround the Pistol and Machine

Gun Range (SR891) on three sides (u-shaped). The firing lanes and target stand posts of the former pistol range were observed. Numerous cartridge casings, shotgun shell casings, and shotgun paper and plastic wads were observed throughout the range floor, mostly near the backstop berm. Lead projectiles were also observed to thickly cover the front face of the backstop berm. In the middle of the range floor, one wooden and two metal tables remain, presumably weapons preparation tables. Some limited small arms debris (casings and lead projectiles) was observed on the top of the side berm to the northeast of the backstop berm. Additionally, two small-elongated soil piles were observed behind the main backstop berm that contained small arms debris (lead projectiles) on their surface. It appears these piles may have been moved to this location during berm maintenance activities.

Various target debris (sheet metal, empty drums, etc.) were observed near and on the front face of the backstop berm. Some clay target debris was observed on the face of the backstop berm. The clay targets appeared to have been used as stationary targets for the pistol range rather than being related to the Skeet Range formerly located to the north of the Pistol and Machine Gun Range.

Other non-munitions/non-range related debris was observed on the surface of the ground in a small junk/debris pile located just outside the chain-link fence in the northwest corner of the range.

Two roads are present behind the main backstop berm. One is a generally north-south gravel road providing access to other facilities in the area, and one is an older unimproved road, which follows a Base water line in an east-west orientation. Neither road leads into the range.

No munitions-related items meeting the definition of MEC (**Appendix A**) were identified at the Pistol and Machine Gun Range (SR891). Visual survey field notes are provided in **Appendix E** and photographs taken during the visual survey and are presented in **Appendix D**.

5.1.6.2 Media Sampling Results

Surface soil and subsurface soil samples were collected and analyzed to determine if MC was present in the environment at the Pistol and Machine Gun Range (SR891). Samples were collected in a grid-like pattern with sample points spaced approximately 25-feet apart as presented on **Figure 5-2**. Surface soil samples were collected using disposable scoops and subsurface samples were collected using a hand operated bucket auger. Each sample was analyzed in the field using XRF field analysis. The results of the XRF field analysis were used to delineate the nature and extent of lead contamination in the surface and subsurface soils and to characterize potential source areas of contamination.

One groundwater sample was collected via direct push near the location with the most elevated lead-in-soil concentration in order to address potential migration of lead from soil to groundwater.

All data were used to identify any potential risks to human receptors.

XRF Analysis Results

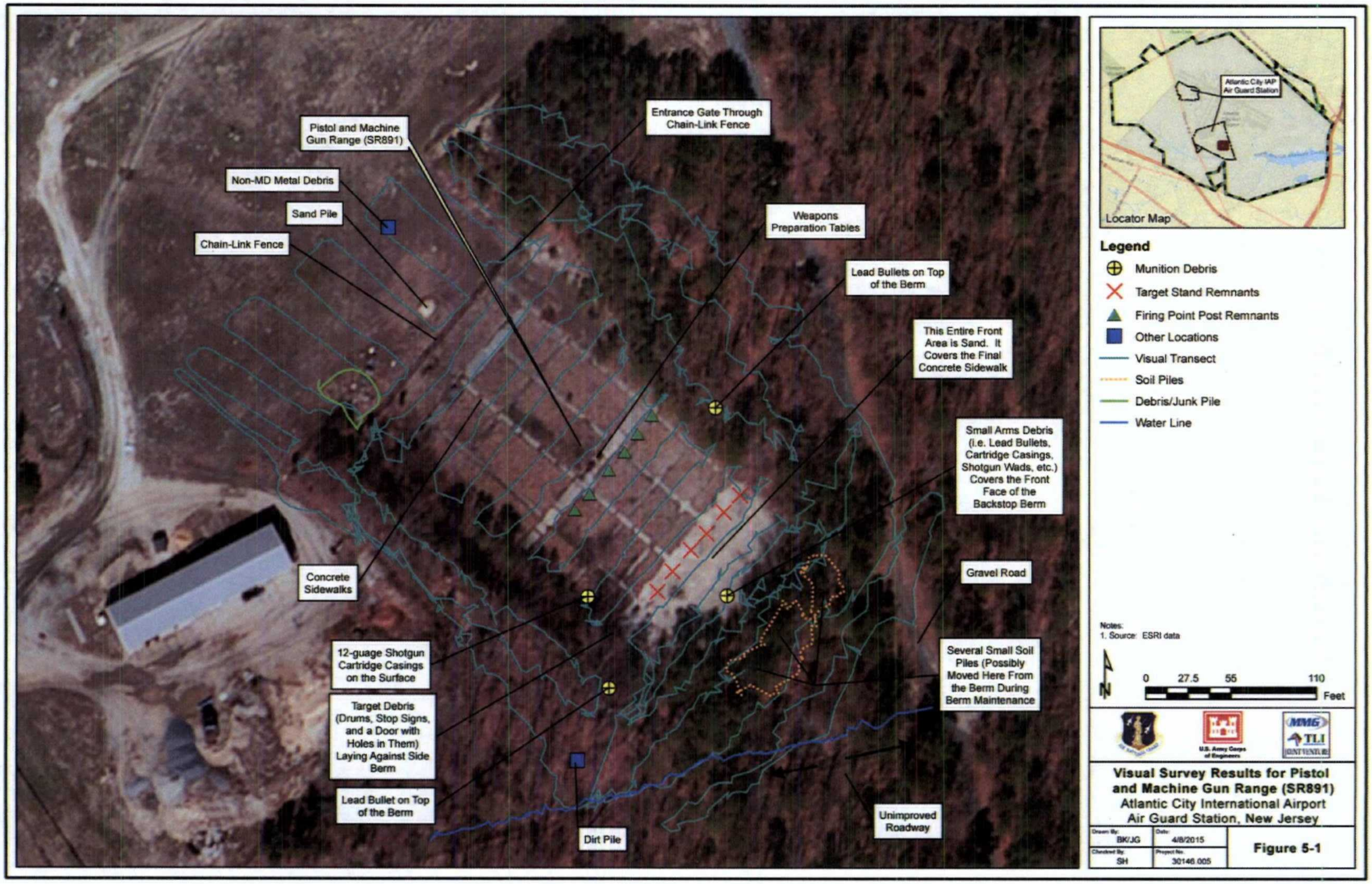
A total of 182 surface soil samples and 187 subsurface soil samples were collected and analyzed for lead. The XRF results ranged from non-detect (ND) to 31,965 ppm. One-hundred and sixty-eight (168) XRF surface sample results exceeded the background UTL calculation (18.71 mg/kg); sixty-nine (69) of these also exceeded human health screening levels for lead in residential soil (400 mg/kg). One hundred and seventy-nine XRF surface sample results exceeded the ecological screening level for surface soil. A total of forty-one (41) subsurface sample results exceeded the human health screening levels for lead in residential soil (400 mg/kg).

The XRF results are summarized in **Table 5-1**. The XRF sampling locations and results for lead are shown on **Figure 5-2**. The results of the human health risk screening are discussed in **Section 9.3.1**. The results of the ecological risk screening are discussed in **Section 10.3.1**.

Laboratory Analysis Results

Eighteen laboratory correlation samples were collected and their results are discussed and presented in **Section 4.3.1.1** and **Table 4-2**. Ten background samples were collected and sent for laboratory analysis and their results are discussed in **Section 4.4.3**.

Additionally, one groundwater sample (plus one duplicate) was collected via direct push near the locations with the most elevated lead-in-soil concentrations. These samples were collected and analyzed for lead following USEPA Method 6010B. The purpose of this sample was to evaluate the potential migration of lead from soil to groundwater. The lead result in the groundwater sample was 83 ug/L (duplicate result was 79 ug/L). These sample results exceeded the human health screening levels for lead in groundwater (5 ug/L).



Visual Survey Results for Pistol and Machine Gun Range (SR891)
Atlantic City International Airport Air Guard Station, New Jersey

Figure 5-1

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TABLE 5-1
PISTOL AND MACHINE GUN RANGE (SR891)
XRF LEAD RESULTS

Field ID	Sample Depth (feet bgs)	Lead by XRF (ppm) Result	%RSD [1]
SR891-EX001-SS-0.5	0.5	13	8
SR891-EX002-SS-0.5	0.5	**24**	4
SR891-EX003-SS-0.5	0.5	14	15
SR891-EX004-SS-0.5	0.5	15	10
SR891-EX005-SS-0.5	0.5	**22**	34
SR891-EX006-SS-0.5	0.5	**29**	9
SR891-EX007-SS-0.5	0.5	**25**	31
SR891-EX008-SS-0.5	0.5	**48**	9
SR891-EX009-SS-0.5	0.5	**28**	10
SR891-EX010-SS-0.5	0.5	**46**	9
SR891-EX011-SS-0.5	0.5	**193**	12
SR891-EX012-SS-0.5	0.5	**95**	11
SR891-EX013-SS-0.5	0.5	**165**	6
SR891-EX014-SS-0.5	0.5	**271**	10
SR891-EX014-SB-1.0	1.0	16	33
SR891-EX015-SS-0.5	0.5	**638**	5
SR891-EX015-SB-1.0	1.0	46	10
SR891-EX016-SS-0.5	0.5	**1368**	3
SR891-EX016-SB-1.0	1.0	14	NA
SR891-EX017-SS-0.5	0.5	**613**	13
SR891-EX017-SB-1.0	1.0	50	7
SR891-EX018-SS-0.5	0.5	**2526**	8
SR891-EX018-SB-1.0	1.0	255	5
SR891-EX018-SB-1.5	1.5	20	24
SR891-EX018-SB-2.0	2.0	14	12
SR891-EX019-SS-0.5	0.5	**11423**	19
SR891-EX019-SB-1.0	1.0	**1329**	7
SR891-EX019-SB-1.5	1.5	**438**	17
SR891-EX019-SB-2.0	2.0	72	20
SR891-EX020-SS-0.5	0.5	**14764**	0
SR891-EX020-SB-1.0	1.0	**1661**	12
SR891-EX020-SB-1.5	1.5	**3483**	31[2]
SR891-EX020-SB-2.0	2.0	**1183**	20
SR891-EX020-SB-2.5	2.5	173	4
SR891-EX021-SS-0.5	0.5	**7494**	16
SR891-EX021-SB-1.0	1.0	**890**	15
SR891-EX021-SB-1.5	1.5	**446**	16
SR891-EX021-SB-2.0	2.0	**698**	22[2]
SR891-EX021-SB-2.5	2.5	101	7
SR891-EX022-SS-0.5	0.5	**3878**	18
SR891-EX022-SB-1.0	1.0	**1623**	7
SR891-EX022-SB-1.5	1.5	**799**	14
SR891-EX022-SB-2.0	2.0	310	4
SR891-EX022-SB-2.5	2.5	201	11
SR891-EX022-SB-3.0	3.0	226	6
SR891-EX022-SB-3.5	3.5	206	5
SR891-EX022-SB-4.0	4.0	177	11
SR891-EX023-SS-0.5	0.5	**1050**	11
SR891-EX023-SB-1.0	1.0	86	13
SR891-EX024-SS-0.5	0.5	**379**	7
SR891-EX024-SB-1.0	1.0	50	4
SR891-EX025-SS-0.5	0.5	**124**	1
SR891-EX026-SS-0.5	0.5	**431**	19
SR891-EX026-SB-1.0	1.0	78	14
SR891-EX027-SS-0.5	0.5	**249**	11
SR891-EX027-SB-1.0	1.0	26	13
SR891-EX028-SS-0.5	0.5	**1173**	11
SR891-EX028-SB-1.0	1.0	33	27
SR891-EX029-SS-0.5	0.5	**179**	6
SR891-EX030-SS-0.5	0.5	**101**	10
SR891-EX031-SS-0.5	0.5	**311**	18
SR891-EX031-SB-1.0	1.0	18	10
SR891-EX032-SS-0.5	0.5	**501**	7
SR891-EX032-SB-1.0	1.0	33	17
SR891-EX033-SS-0.5	0.5	**119**	17
SR891-EX034-SS-0.5	0.5	18	0
SR891-EX035-SS-0.5	0.5	**239**	14
SR891-EX035-SB-1.0	1.0	32	21
SR891-EX036-SS-0.5	0.5	**206**	12
SR891-EX036-SB-1.0	1.0	10	NA
SR891-EX037-SS-0.5	0.5	**91**	7
SR891-EX038-SS-0.5	0.5	**1418**	6
SR891-EX038-SB-1.0	1.0	82	10
SR891-EX039-SS-0.5	0.5	**90**	4
SR891-EX040-SS-0.5	0.5	**93**	5
SR891-EX041-SS-0.5	0.5	**158**	6
SR891-EX042-SS-0.5	0.5	**1699**	7
SR891-EX042-SB-1.0	1.0	47	2
SR891-EX043-SS-0.5	0.5	**440**	11
SR891-EX043-SB-1.0	1.0	26	19
SR891-EX044-SS-0.5	0.5	**1865**	7
SR891-EX044-SB-1.0	1.0	82	6
SR891-EX045-SS-0.5	0.5	**2390**	15
SR891-EX045-SB-1.0	1.0	48	23
SR891-EX046-SS-0.5	0.5	**3407**	4
SR891-EX046-SB-1.0	1.0	**1268**	11
SR891-EX046-SB-1.5	1.5	**427**	11
SR891-EX046-SB-2.0	2.0	140	11
SR891-EX047-SS-0.5	0.5	**10145**	8
SR891-EX047-SB-1.0	1.0	232	7

Field ID	Sample Depth (feet bgs)	Lead by XRF (ppm)	
		Result	%RSD[1]
SR891-EX047-SB-1.5	1.5	109	8
SR891-EX047-SB-2.0	2.0	79	5
SR891-EX048-SS-0.5	0.5	**185**	7
SR891-EX048-SB-1.0	1.0	21	8
SR891-EX048-SB-1.5	1.5	ND	NA
SR891-EX048-SB-2.0	2.0	ND	NA
SR891-EX049-SS-0.5	0.5	**617**	12
SR891-EX049-SB-1.0	1.0	25	21
SR891-EX050-SS-0.5	0.5	**224**	4
SR891-EX050-SB-1.0	1.0	158	2
SR891-EX051-SS-0.5	0.5	**882**	13
SR891-EX051-SB-1.0	1.0	34	40
SR891-EX052-SS-0.5	0.5	**948**	18
SR891-EX052-SB-1.0	1.0	57	4
SR891-EX053-SS-0.5	0.5	**24**	22
SR891-EX053-SB-1.0	1.0	37	9
SR891-EX053-SB-1.5	1.5	12	14
SR891-EX053-SB-2.0	2.0	17	9
SR891-EX054-SS-0.5	0.5	18	11
SR891-EX054-SB-1.0	1.0	14	34
SR891-EX054-SB-1.5	1.5	14	5
SR891-EX054-SB-2.0	2.0	44	3
SR891-EX055-SS-0.5	0.5	**11606**	16
SR891-EX055-SB-1.0	1.0	**9500**	20
SR891-EX055-SB-1.5	1.5	105	20
SR891-EX055-SB-2.0	2.0	136	2
SR891-EX056-SS-0.5	0.5	**4562**	11
SR891-EX056-SB-1.0	1.0	**1543**	6
SR891-EX056-SB-1.5	1.5	233	12
SR891-EX056-SB-2.0	2.0	213	8
SR891-EX056-SB-2.5	2.5	**814**	8
SR891-EX056-SB-3.0	3.0	**499**	5
SR891-EX056-SB-3.5	3.5	370	5
SR891-EX056-SB-4.0	4.0	**528**	2
SR891-EX056-SB-4.5	4.5	214	2
SR891-EX056-SB-5.0	5.0	201	7
SR891-EX057-SS-0.5	0.5	**2842**	1
SR891-EX057-SB-1.0	1.0	**2751**	4
SR891-EX057-SB-1.5	1.5	200	6
SR891-EX057-SB-2.0	2.0	38	24
SR891-EX058-SS-0.5	0.5	**4961**	6
SR891-EX058-SB-1.0	1.0	**1945**	18[2]
SR891-EX058-SB-1.5	1.5	**1129**	5
SR891-EX058-SB-2.0	2.0	174	9
SR891-EX059-SS-0.5	0.5	**537**	2
SR891-EX059-SB-1.0	1.0	15	7
SR891-EX060-SS-0.5	0.5	**665**	11
SR891-EX060-SB-1.0	1.0	29	8
SR891-EX061-SS-0.5	0.5	**931**	12

Field ID	Sample Depth (feet bgs)	Lead by XRF (ppm)	
		Result	%RSD[1]
SR891-EX061-SB-1.0	1.0	119	17
SR891-EX062-SS-0.5	0.5	**1188**	5
SR891-EX062-SB-1.0	1.0	25	8
SR891-EX063-SS-0.5	0.5	**657**	5
SR891-EX063-SB-1.0	1.0	26	22
SR891-EX064-SS-0.5	0.5	**423**	4
SR891-EX064-SB-1.0	1.0	21	48
SR891-EX065-SS-0.5	0.5	**124**	13
SR891-EX066-SS-0.5	0.5	**1081**	1
SR891-EX066-SB-1.0	1.0	35	24
SR891-EX067-SS-0.5	0.5	**93**	10
SR891-EX068-SS-0.5	0.5	**37**	10
SR891-EX069-SS-0.5	0.5	**51**	3
SR891-EX070-SS-0.5	0.5	**54**	12
SR891-EX071-SS-0.5	0.5	**35**	20
SR891-EX072-SS-0.5	0.5	**27**	12
SR891-EX073-SS-0.5	0.5	**49**	27
SR891-EX074-SS-0.5	0.5	**339**	16
SR891-EX074-SB-1.0	1.0	41	8
SR891-EX075-SS-0.5	0.5	**492**	1
SR891-EX075-SB-1.0	1.0	18	23
SR891-EX076-SS-0.5	0.5	**386**	6
SR891-EX076-SB-1.0	1.0	17	25
SR891-EX077-SS-0.5	0.5	**1932**	19
SR891-EX077-SB-1.0	1.0	26	11
SR891-EX078-SS-0.5	0.5	**867**	12
SR891-EX078-SB-1.0	1.0	19	0
SR891-EX079-SS-0.5	0.5	**1276**	4
SR891-EX079-SB-1.0	1.0	**1267**	5
SR891-EX079-SB-1.5	1.5	60	14
SR891-EX080-SS-0.5	0.5	**611**	6
SR891-EX080-SB-1.0	1.0	20	8
SR891-EX081-SS-0.5	0.5	**510**	10
SR891-EX081-SB-1.0	1.0	17	33
SR891-EX082-SS-0.5	0.5	**813**	14
SR891-EX082-SB-1.0	1.0	30	48
SR891-EX083-SS-0.5	0.5	**5161**	9
SR891-EX083-SB-1.0	1.0	**738**	13
SR891-EX083-SB-1.5	1.5	354	9
SR891-EX083-SB-2.0	2.0	**579**	16
SR891-EX083-SB-2.5	2.5	353	10
SR891-EX084-SS-0.5	0.5	**5180**	10
SR891-EX084-SB-1.0	1.0	**949**	7
SR891-EX084-SB-1.5	1.5	**455**	4
SR891-EX084-SB-2.0	2.0	92	5
SR891-EX085-SS-0.5	0.5	**1900**	4
SR891-EX085-SB-1.0	1.0	**1280**	5
SR891-EX085-SB-1.5	1.5	377	19
SR891-EX085-SB-2.0	2.0	239	11

Field ID	Sample Depth (feet bgs)	Lead by XRF (ppm) Result	%RSD [1]
SR891-EX085-SB-2.5	2.5	171	2
SR891-EX086-SS-0.5	0.5	**4636**	6
SR891-EX086-SB-1.0	1.0	128	3
SR891-EX086-SB-1.5	1.5	54	6
SR891-EX086-SB-2.0	2.0	55	5
SR891-EX087-SS-0.5	0.5	**162**	3
SR891-EX087-SB-1.0	1.0	82	21
SR891-EX087-SB-1.5	1.5	12	5
SR891-EX087-SB-2.0	2.0	16	NA
SR891-EX088-SS-0.5	0.5	**219**	4
SR891-EX088-SB-1.0	1.0	125	7
SR891-EX088-SB-1.5	1.5	17	24
SR891-EX088-SB-2.0	2.0	17	NA
SR891-EX089-SS-0.5	0.5	**465**	13
SR891-EX089-SB-1.0	1.0	13	15
SR891-EX090-SS-0.5	0.5	**409**	12
SR891-EX090-SB-1.0	1.0	44	10
SR891-EX091-SS-0.5	0.5	**779**	16
SR891-EX091-SB-1.0	1.0	70	16
SR891-EX092-SS-0.5	0.5	**3819**	4
SR891-EX092-SB-1.0	1.0	134	7
SR891-EX093-SS-0.5	0.5	**521**	8
SR891-EX093-SB-1.0	1.0	35	27
SR891-EX093-SB-1.5	1.5	14	5
SR891-EX093-SB-2.0	2.0	13	11
SR891-EX094-SS-0.5	0.5	**2682**	20
SR891-EX094-SB-1.0	1.0	117	8
SR891-EX094-SB-1.5	1.5	55	22 [2]
SR891-EX094-SB-2.0	2.0	15	NA
SR891-EX095-SS-0.5	0.5	**31965**	7
SR891-EX095-SB-1.0	1.0	**2143**	6
SR891-EX095-SB-1.5	1.5	157	5
SR891-EX095-SB-2.0	2.0	69	8
SR891-EX096-SS-0.5	0.5	**6103**	15
SR891-EX096-SB-1.0	1.0	**866**	10
SR891-EX096-SB-1.5	1.5	**1039**	8
SR891-EX096-SB-2.0	2.0	263	11
SR891-EX096-SB-2.5	2.5	**569**	7
SR891-EX096-SB-3.0	3.0	**756**	6
SR891-EX096-SB-3.5	3.5	**525**	3
SR891-EX096-SB-4.0	4.0	253	5
SR891-EX096-SB-4.5	4.5	216	4
SR891-EX096-SB-5.0	5.0	203	1
SR891-EX096-SB-5.5	5.5	219	4
SR891-EX097-SS-0.5	0.5	**5411**	10
SR891-EX097-SB-1.0	1.0	259	17
SR891-EX097-SB-1.5	1.5	66	9
SR891-EX098-SS-0.5	0.5	**10690**	6
SR891-EX098-SB-1.0	1.0	**979**	5

Field ID	Sample Depth (feet bgs)	Lead by XRF (ppm) Result	%RSD [1]
SR891-EX098-SB-1.5	1.5	218	9
SR891-EX098-SB-2.0	2.0	369	3
SR891-EX098-SB-2.5	2.5	**611**	3
SR891-EX099-SS-0.5	0.5	**676**	7
SR891-EX099-SB-1.0	1.0	47	34
SR891-EX100-SS-0.5	0.5	**295**	17
SR891-EX100-SB-1.0	1.0	59	11
SR891-EX101-SS-0.5	0.5	**397**	13
SR891-EX101-SB-1.0	1.0	23	24
SR891-EX102-SS-0.5	0.5	**295**	2
SR891-EX102-SB-1.0	1.0	26	2
SR891-EX103-SS-0.5	0.5	**173**	3
SR891-EX104-SS-0.5	0.5	**93**	5
SR891-EX105-SS-0.5	0.5	**38**	9
SR891-EX106-SS-0.5	0.5	**328**	9
SR891-EX106-SB-1.0	1.0	28	41
SR891-EX107-SS-0.5	0.5	**38**	7
SR891-EX108-SS-0.5	0.5	**168**	3
SR891-EX109-SS-0.5	0.5	**78**	5
SR891-EX110-SS-0.5	0.5	12	NA
SR891-EX111-SS-0.5	0.5	ND	NA
SR891-EX112-SS-0.5	0.5	12	NA
SR891-EX113-SS-0.5	0.5	**45**	14
SR891-EX114-SS-0.5	0.5	**54**	15
SR891-EX115-SS-0.5	0.5	**165**	11
SR891-EX116-SS-0.5	0.5	**46**	12
SR891-EX117-SS-0.5	0.5	**69**	6
SR891-EX118-SS-0.5	0.5	**67**	9
SR891-EX119-SS-0.5	0.5	**282**	2
SR891-EX119-SB-1.0	1.0	23	18
SR891-EX120-SS-0.5	0.5	**122**	3
SR891-EX121-SS-0.5	0.5	**278**	10
SR891-EX121-SB-1.0	1.0	30	17
SR891-EX122-SS-0.5	0.5	**5016**	15
SR891-EX122-SB-1.0	1.0	152	6
SR891-EX123-SS-0.5	0.5	**4209**	14
SR891-EX123-SB-1.0	1.0	**1806**	6
SR891-EX123-SB-1.5	1.5	**1104**	10
SR891-EX123-SB-2.0	2.0	288	14
SR891-EX123-SB-2.5	2.5	**857**	4
SR891-EX123-SB-3.0	3.0	NA	NA
SR891-EX123-SB-3.5	3.5	236	9
SR891-EX123-SB-4.0	4.0	253	1
SR891-EX123-SB-4.5	4.5	197	2
SR891-EX124-SS-0.5	0.5	**473**	17
SR891-EX124-SB-1.0	1.0	85	21
SR891-EX124-SB-1.5	1.5	44	15
SR891-EX124-SB-2.0	2.0	18	15
SR891-EX125-SS-0.5	0.5	**1585**	17

Field ID	Sample Depth (feet bgs)	Lead by XRF (ppm) Result	Lead by XRF (ppm) %RSD[1]
SR891-EX125-SB-1.0	1.0	33	35
SR891-EX126-SS-0.5	0.5	**634**	15
SR891-EX126-SB-1.0	1.0	50	8
SR891-EX127-SS-0.5	0.5	**142**	10
SR891-EX128-SS-0.5	0.5	**1958**	5
SR891-EX128-SB-1.0	1.0	45	10
SR891-EX129-SS-0.5	0.5	**3431**	8[2]
SR891-EX129-SB-1.0	1.0	64	28[2]
SR891-EX129-SB-1.5	1.5	67	12
SR891-EX129-SB-2.0	2.0	27	13
SR891-EX130-SS-0.5	0.5	**3866**	2
SR891-EX130-SB-1.0	1.0	**738**	13
SR891-EX130-SB-1.5	1.5	**1093**	11
SR891-EX130-SB-2.0	2.0	**788**	14
SR891-EX130-SB-2.5	2.5	**673**	3
SR891-EX130-SB-3.0	3.0	274	11
SR891-EX130-SB-3.5	3.5	153	8
SR891-EX131-SS-0.5	0.5	**211**	16
SR891-EX131-SB-1.0	1.0	66	10
SR891-EX132-SS-0.5	0.5	**236**	10
SR891-EX132-SB-1.0	1.0	75	6
SR891-EX133-SS-0.5	0.5	**120**	18
SR891-EX134-SS-0.5	0.5	**87**	4
SR891-EX135-SS-0.5	0.5	**205**	3
SR891-EX135-SB-1.0	1.0	61	12
SR891-EX136-SS-0.5	0.5	**61**	20
SR891-EX137-SS-0.5	0.5	**42**	9
SR891-EX138-SS-0.5	0.5	**27**	2
SR891-EX139-SS-0.5	0.5	**54**	9
SR891-EX140-SS-0.5	0.5	13	20
SR891-EX141-SS-0.5	0.5	ND	NA
SR891-EX142-SS-0.5	0.5	11	16
SR891-EX143-SS-0.5	0.5	**19**	6
SR891-EX144-SS-0.5	0.5	**45**	16
SR891-EX145-SS-0.5	0.5	**21**	12
SR891-EX146-SS-0.5	0.5	**24**	11
SR891-EX147-SS-0.5	0.5	17	NA
SR891-EX148-SS-0.5	0.5	**25**	28
SR891-EX149-SS-0.5	0.5	**39**	3
SR891-EX150-SS-0.5	0.5	**22**	18
SR891-EX151-SS-0.5	0.5	**70**	17
SR891-EX152-SS-0.5	0.5	**52**	13
SR891-EX153-SS-0.5	0.5	**191**	18
SR891-EX154-SS-0.5	0.5	**155**	20
SR891-EX155-SS-0.5	0.5	**268**	2
SR891-EX155-SB-1.0	1.0	78	24
SR891-EX156-SS-0.5	0.5	**379**	17
SR891-EX156-SB-1.0	1.0	29	7
SR891-EX157-SS-0.5	0.5	**34**	5

Field ID	Sample Depth (feet bgs)	Lead by XRF (ppm) Result	Lead by XRF (ppm) %RSD[1]
SR891-EX158-SS-0.5	0.5	**52**	17
SR891-EX159-SS-0.5	0.5	**92**	12
SR891-EX160-SS-0.5	0.5	**868**	16
SR891-EX160-SB-1.0	1.0	61	12
SR891-EX161-SS-0.5	0.5	**1645**	12
SR891-EX161-SB-1.0	1.0	145	27
SR891-EX162-SS-0.5	0.5	**172**	2
SR891-EX163-SS-0.5	0.5	**1292**	22[2]
SR891-EX163-SB-1.0	1.0	37	12
SR891-EX164-SS-0.5	0.5	**800**	4
SR891-EX164-SB-1.0	1.0	27	12
SR891-EX165-SS-0.5	0.5	**474**	5
SR891-EX165-SB-1.0	1.0	36	41
SR891-EX166-SS-0.5	0.5	12	0
SR891-EX167-SS-0.5	0.5	**24**	15
SR891-EX168-SS-0.5	0.5	14	4
SR891-EX169-SS-0.5	0.5	**217**	3
SR891-EX169-SB-1.0	1.0	13	22
SR891-EX170-SS-0.5	0.5	**345**	3
SR891-EX170-SB-1.0	1.0	24	33
SR891-EX171-SS-0.5	0.5	**34**	21
SR891-EX172-SS-0.5	0.5	**358**	18
SR891-EX172-SB-1.0	1.0	49	46
SR891-EX173-SS-0.5	0.5	**1306**	15
SR891-EX173-SB-1.0	1.0	24	33
SR891-EX174-SS-0.5	0.5	**32**	5
SR891-EX175-SS-0.5	0.5	**62**	8
SR891-EX176-SS-0.5	0.5	**45**	4
SR891-EX177-SS-0.5	0.5	**86**	6
SR891-EX178-SS-0.5	0.5	**125**	10
SR891-EX179-SS-0.5	0.5	**29**	25
SR891-EX180-SS-0.5	0.5	**33**	9
SR891-EX181-SS-0.5	0.5	**151**	7
SR891-EX182-SS-0.5	0.5	**37**	14
	Maximum	31,965	

Notes:

Bold	The surface sample concentration exceeded the background screening calculation.
Bold (shaded)	The sample concentration exceeded Human Health Screening Criteria (i.e., exceeded human health and background screening).

[1] If "NA," %RSD not calculable, one or more XRF values reported as non-detect.

[2]High %RSD - Samples noted with High %RSD were locations where the XRF field analysis resulted in a >20% RSD, even after several analysis attempts. Further analysis attempts were abandoned because the initial attempts resulted in lead concentrations significantly higher than 200 mg/kg (field screening value) and/or the next sample interval was going to be collected anyway, as presented in **Table 4-1** and **Table 5-1**

%RSD = percent relative standard deviation
ID = identification
bgs = below ground surface
NA = not available. See note 1.
ND = Non-detect
ppm = parts per million
EX = Ex-situ soil sample
XRF = X-ray fluorescence
SR891 = Pistol and Machine Gun Range (SR891)

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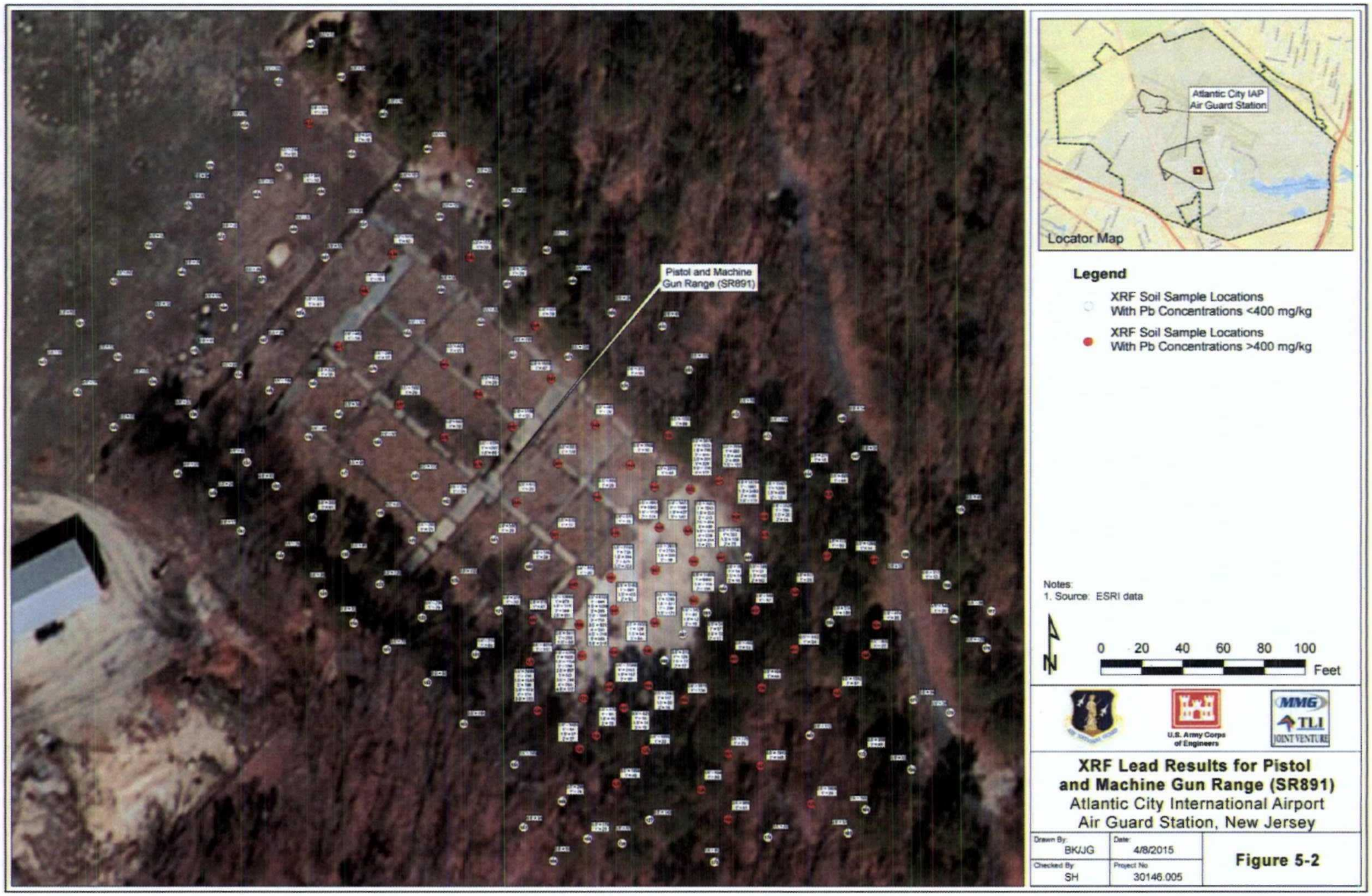

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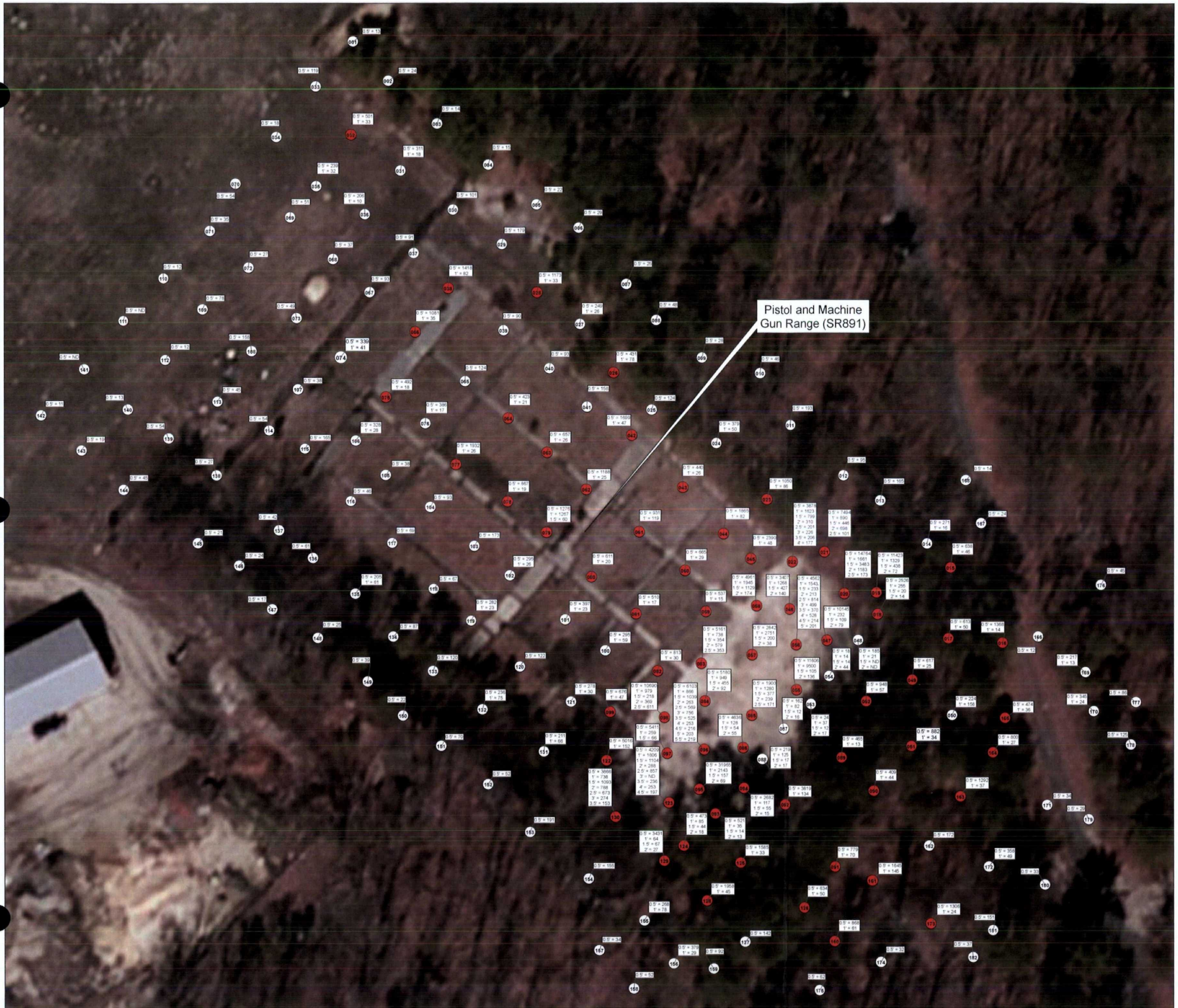

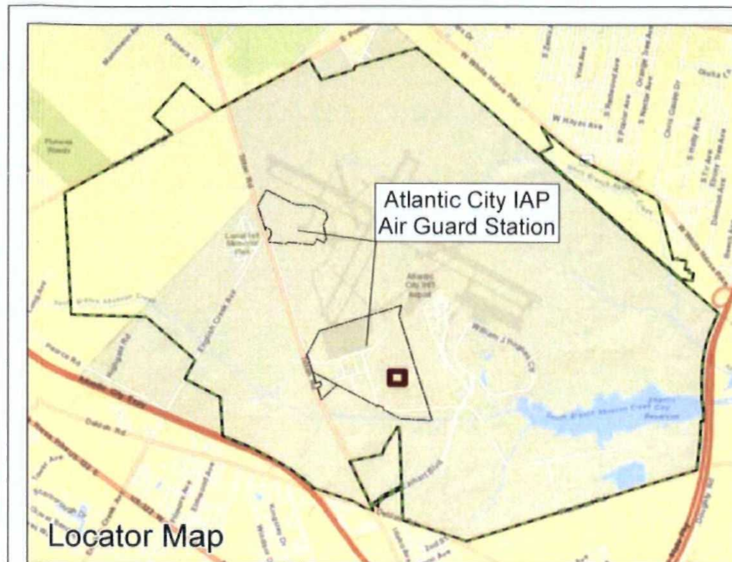

Legend

XRF Soil Sample Locations With Pb Concentrations <400 mg/kg

XRF Soil Sample Locations With Pb Concentrations >400 mg/kg

Notes:
1. Source: ESRI data

N

0 20 40 60 80 100 Feet

U.S. Army Corps of Engineers

MMG TLI JOINT VENTURE

XRF Lead Results for Pistol and Machine Gun Range (SR891)

Atlantic City International Airport
Air Guard Station, New Jersey

Drawn By: BK/JG	Date: 4/8/2015	Figure 5-2
Checked By: SH	Project No. 30146.005	

5.2 BACKGROUND DETERMINATION

Background samples were collected as part of the CSE Phase II investigation. Background values at Atlantic City IAP AGS are discussed in **Section 4.4.3**, summarized in **Table 4-4**, shown in **Figure 4-2**, and included in **Appendix J**.

5.3 IDENTIFICATION OF POTENTIAL RECEPTORS

Receptors at the Pistol and Machine Gun Range (SR891) include current and future site workers and construction workers, and potential future recreational users and residents.

- Site workers include current and future installation personnel who have access to the MRA, as well as other types of workers who may be exposed to soil and possibly groundwater.
- Construction workers include current and future intrusive workers who may work at the MRA to transform the property for its next intended use, as well as other types of workers who may also be exposed to soil.
- Recreational users include people who may, in the future, use or move across the MRA during recreational activities (i.e., joggers).
- Residents include people who may live within the MRA boundary if housing is developed on this property in the future.

The MRA is located in an area of the installation with a relatively low level of recent development (zoned light industrial). The main floor of the old range is covered with grass, which is mowed periodically. The three bermed sides of the range are wooded and border wooded areas. Since the habitat associated with this MRA could accommodate wildlife and there are threatened species noted in the Atlantic County area (**Section 5.4.1**), biota is considered a potential receptor at this MRA.

5.4 NATURAL AND CULTURAL RESOURCES

There are no known or suspected cultural or archaeological sites located at or near the MRA at Atlantic City IAP AGS.

5.4.1 Rare, Threatened, or Endangered Species

The U.S. Fish and Wildlife Service has identified the following species as threatened, endangered, or of special status in Atlantic County, NJ: including three birds - Arctic peregrine Falcon (Falco peregrinus tundrius), Piping Plover (Charadrius melodus), Red knot (Calidris canutus rufa); five plants - Hirsts' Panic grass (Dichanthelium hirstii), Knieskern's Beaked-rush (Rhynchospora knieskemii), Swamp pink (Helonias bullata), Bog Asphodel (Narthecium americanum), Seabeach amaranth (Amaranthus pumilus); and four reptiles - Hawksbill sea turtle (Eremochelys imbricate), leatherback sea turtle (Dermochelys coriacea), Green sea turtle (Chelonia Mydas), and Loggerhead sea turtle (Caretta caretta). (http://ecos.fws.gov/tess_public/countySearch!speciesByCountyReport.action?fips=34001).

Although the habitat associated with this MRA could accommodate wildlife, it is not known if these threatened, endangered, or of special status species specifically inhabit the Pistol and Machine Gun Range (SR891).

5.4.2 Cultural Resources

No building structures of historic significance are on record at Atlantic City IAP AGS.

Section 6

This section discusses the known or suspected MEC and munitions debris at Atlantic City IAP AGS.

6.1 MEC TECHNICAL DATA

No MEC was encountered during the CSE Phase II investigation of the Pistol and Machine Gun Range (SR891); however, munitions debris in the form of small arms debris was encountered. **Table 6-1** summarizes the technical data for the munitions debris listed below. Technical data sheets for these munitions are included in **Appendix F**.

6.1.1 Pistol and Machine Gun Range (SR891)

The following munitions-related items were considered to be potentially present at the Pistol and Machine Gun Range (SR891). The items marked with an **asterisk** (*) were confirmed to be present:

- U.S. Cartridge, Caliber .22, Ball*
- U.S. Cartridge, 5.56mm, Ball*
- U.S. Cartridge, Caliber .30, Ball
- U.S. Cartridge, Caliber .32, Ball
- U.S. Cartridge, Caliber 9mm, Ball*
- U.S. Cartridge, Caliber .38, Ball*
- U.S. Cartridge, 7.62mm, Ball
- U.S. Cartridge, Caliber .45, Ball*
- U.S. Cartridge, 12 Gauge, Shotgun Rounds*

No munitions items meeting the definition of MEC were encountered during the CSE Phase II field activities. Lead projectiles (bullets, copper jackets, lead shot) were observed heavily covering the face of the backstop berm, and in some soil samples up to 4-ft deep. Additional small arms debris including numerous spent cartridge casings, spent shotgun shells, and shotgun wads were observed on the surface of the range floor of MRA.

6.2 MEC PRIMARY SOURCES AND RELEASE MECHANISMS

No primary sources or potential release mechanisms for MEC, that are associated with historical or current range activities, were identified at the Pistol and Machine Gun Range (SR891).

6.3 MEC SECONDARY SOURCES

Secondary sources are the media to which MEC and MC have been released. Because there are no primary sources of MEC, there is no potential for secondary sources at the Pistol and Machine Gun Range (SR891).

6.4 MEC PENETRATION ESTIMATES

Because no primary sources of MEC were found at the Pistol and Machine Gun Range (SR891), MEC penetration estimates are not available.

For the Pistol and Machine Gun Range (SR891) at Atlantic City IAP AGS, any dropped small arms cartridges will typically be found within inches of the surface, unless tilling or digging has physically disturbed the area. The estimated penetration depth for the primary berm behind the targets is up to 24 inches, depending on the soil type used for the berm. Penetration into the side berms and range floor is typically 12 inches or less (ITRC 2003).

6.5 SPECIAL CONSIDERATION MEC

Historical evidence indicates that chemical weapons were stored/used at the former NAS; however, no further indications of releases have been documented. It should be noted that during the WWII timeframe smoke and incendiary munitions were considered to be chemical munitions. No evidence indicating the potential use of radioactive or chemical weapons was found during CSE Phase II activities at the Pistol and Machine Gun Range (SR891).

6.6 KNOWN/SUSPECTED MUNITIONS CONSTITUENTS

A summary of the types of munitions and the MC contamination associated with each munition that may have been used at Pistol and Machine Gun Range (SR891) is presented in **Table 6-1**. Technical data sheets for these munitions are included in **Appendix F**.

Based on the historical land use at the Pistol and Machine Gun Range (SR891), lead is considered to be potential MC. Lead is the indicator and the primary risk driver of small arms use. Small arms projectiles are typically comprised of 90 to 99 percent lead. Other potential MC associated with small arms use include antimony, copper, and zinc. These other potential constituents are unlikely to be a concern because they are present at negligible quantities/concentrations, are typically consumed when fired, or are co-located with lead.

6.7 EXPLOSIVES SAFETY SUBMISSION INFORMATION

No ESSs have been prepared for Atlantic City IAP AGS. An ESS is generally not required for investigations in which anomaly avoidance procedures are implemented; it ensures that applicable DoD standards for explosives safety are followed during military munitions response actions. Design elements of the ESS that are relevant to potential remedial activities at Atlantic City IAP AGS are described in this section.

6.7.1 Munitions with the Greatest Fragmentation Distance

For quantity-distance purposes, the munition with the greatest fragmentation distance (MGFD) shall be established for each MRA. The MGFD is the munitions item with the greatest fragment distance that can reasonably be expected to exist in any particular MRA. The MGFD can be selected from historical or site investigation data; site investigation data are best. For Atlantic

City IAP AGS, only historical data and the CSE Phase I and Phase II visual survey findings were available for the MGFD calculation.

No fragmenting munitions were suspected and no fragmenting munitions were observed at the Pistol and Machine Gun Range (SR891).

6.7.2 Maximum Credible Event

A Maximum Credible Event (MCE) would have been established for any explosives-contaminated soil. The MCE is the concentration of explosives times the weight of the soil/explosives mixture. Weighted averages or similar mathematical techniques may be used if the concentration varies within the area. The MCE does not apply at Atlantic City IAP AGS, as no explosives-contaminated soils have been identified during CSE activities.

6.7.3 Frost Line

According to Unified Facilities Criteria 3-310-01 (DoD, 2007), the depth of the frost line for Atlantic City IAP AGS is between 29 and 38 inches. This is considered to be the maximum depth where frost may occur and thus the maximum depth where frost-related migration of MEC is possible in the MRA. Refer to **Section 3.4.1** for a description of soils properties at Atlantic City IAP AGS.

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TABLE 6-1
SUMMARY OF MUNITIONS TECHNICAL DATA

Size/Type	Nomenclature	Net Explosive Weight	Munitions Constituents	Reference	Fuzes
			Small Arms Ammunition		
U.S. Cartridge, Caliber .22, Ball, Long Rifle	M24	2.5 grains	Smokeless Powder Propellant	TM 43-0001-27 USMA	NA
		< 1 gram	Percussion Primer		
U.S. Cartridge, 5.56mm, Ball	M193	28.5 or 26.5 grains	WC 844 (Nitrocellulose, Nitroglycerin, Diphenylamine, and Dibutylphthalate) or CMR 170 Propellant	TM 43-0001-27 USMA, F9909241.MW97	NA
		< 1 gram	Percussion Primer		
U.S. Cartridge, 5.56mm, Blank	M200	7 grains	HPC 13 Propellant (Nitrocellulose, Nitroglycerin, and Ethyl Centralite)	TM 43-0001-27 USMA, F9909241.MW97	NA
		< 1 gram	Percussion Primer		
U.S. Cartridge, 7.62mm, Ball	M59	46 grains	WC 846 Propellant (Nitrocellulose, Nitroglycerin, Diphenylamine, and Dibutylphthalate)	TM 43-0001-27 USMA, F9909241.MW97	NA
		< 1 gram	Percussion Primer		
U.S. Cartridge, 7.62mm, Blank	M82	15 grains	SR 8231 Propellant (Nitrocellulose, Dinitrotoluene, Diphenylamine, and Potassium Sulfide)	TM 43-0001-27 USMA, F9909241.MW97	NA
		< 1 gram	Percussion Primer		
U.S. Cartridge, Caliber .30, Ball	M1	13 grains	WC 820 Propellant	TM 43-0001-27 USMA	NA
		< 1 gram	Percussion Primer		
U.S. Cartridge, Caliber .30, Carbine, Ball	M2	50 grains	IMR 4895 Propellant (Nitrocellulose and Dinitrotoluene)	TM 43-0001-27 USMA, F9909241.MW97	NA
		< 1 gram	Percussion Primer		
U.S. Cartridge, Caliber .32, Ball	None	Unknown	Smokeless Powder Propellant	TM 43-0001-27	NA
		< 1 gram	Percussion Primer (Potassium Chlorate and Lead Sulfocyanate)		
U.S. Cartridge, 9mm, Ball	None	5.2 grains	HPC-33 (Nitrocellulose, nitroglycerin	TM 43-0001-27, F9909241.MW97	NA
		< 1 gram	Percussion Primer (Potassium Chlorate and Lead Sulfocyanate)		
U.S. Cartridge, Caliber .38, Ball	None	4.8 grains	Smokeless Powder Propellant	TM43-0001-27	NA
		< 1 gram	Percussion Primer (Potassium Chlorate and Lead Sulfocyanate)		
U.S. Cartridge, Caliber .45, Ball	M1911	5 grains	SR 7970 Propellant (Nitrocellulose, Dinitrotoluene, Diphenylamine)	TM 43-0001-27USMA,F9909241.MW97	NA
		< 1 gram	Percussion Primer (Lead Styphenate, Antimony Sulfide, Barium Nitrate, PETN, Lead Thiocyanate, Tetracene)		
U.S. Cartridge, 12 gauge, Shotgun	None	Unknown	Smokeless Powder Propellant	TM 43-0001-27 USMA	NA
		< 1 gram	Percussion Primer		

TABLE 6-1
SUMMARY OF MUNITIONS TECHNICAL DATA

Size/Type	Nomenclature	Net Explosive Weight	Munitions Constituents	Reference	Fuzes
Small Arms Ammunition					
U.S. Cartridge, 12 gauge, Shotgun	M257	Unknown	Smokeless Powder Propellant	TM 43-0001-27 USMA	NA
		< 1 gram	Percussion Primer		

Sources:
TM 43-0001-27 – Army Ammunition Data Sheets, Small Caliber Ammunition, 1994
USMA – United States Military Academy, Elements of Ordnance, 1938
F9909241.MW97 – Army Environmental Center, Range Scrap (Firing Point) Study Characterization Strategy Report

Notes:
< = less than
M = Model
mm = millimeter
NA = not applicable
U.S. = United States

Section 7

Section 7

This section discusses the hazardous waste/substance issues associated with the Pistol and Machine Gun Range (SR891) at Atlantic City IAP AGS.

7.1 HAZARDOUS WASTE ACTIVITIES

No evidence of hazardous waste activities was identified at the Pistol and Machine Gun Range (SR891) during the CSE Phase II field activities.

7.2 HAZARDOUS WASTE CHARACTERISTICS

No hazardous waste activities were identified at the Pistol and Machine Gun Range (SR891) during the CSE Phase II field activities.

7.3 SOURCE AREAS

No hazardous waste source areas associated with the Pistol and Machine Gun Range (SR891) were identified during the CSE Phase II activities.

7.4 CONTAMINANTS OF CONCERN KNOWN/SUSPECTED RELEASES

There are no contaminants of concern associated with hazardous waste activities. However, potential MCs, including lead, were present at the Pistol and Machine Gun Range (SR891).

7.5 SPECIAL CONSIDERATIONS

No special consideration wastes (i.e., non-MEC biological, radiological, or perchlorate) are known to have been associated with current or historical activities at the Pistol and Machine Gun Range (SR891).

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Section 8

The CSMs were developed to address potential MEC, MC, and/or munitions-related environmental contamination at the Pistol and Machine Gun Range (SR891). This was done by identifying potential contaminant sources and receptors and analyzing the pathways linking them together. The CSMs presented in this report are an update of the ICSMs developed during the CSE Phase I process. Data gaps in the ICSMs were identified, and CSE Phase II field activities were completed to fill in those gaps.

8.1 MEC CONCEPTUAL SITE MODELS

No evidence of potential MEC was identified at the Pistol and Machine Gun Range (SR891) that was associated with historical range activities. Munitions items associated with this MRA were discussed in further detail in **Section 6.1**.

8.1.1 MEC Exposure Pathway Analysis

This section discusses the exposure pathway and hazard assessment for Atlantic City IAP AGS.

8.1.1.1 Transport Processes

No evidence of potential MEC was identified at the Pistol and Machine Gun Range (SR891).

8.1.1.2 Exposure Media and Accessibility

Because no primary sources of MEC or material potentially presenting an explosive hazard has been identified within the Pistol and Machine Gun Range (SR891), no exposure media have been identified.

8.1.1.3 MEC Exposure Receptors

No evidence of potential MEC was identified at the Pistol and Machine Gun Range (SR891).

8.1.1.4 MEC Exposure Conclusions

No complete exposure pathways for MEC exist at the Pistol and Machine Gun Range (SR891).

8.2 MC CONCEPTUAL SITE MODELS

The CSM for MC exposure at the Pistol and Machine Gun Range (SR891) is presented in graphical form in **Figure 8-1** and tabular form on **Table 8-1**. The CSMs identify potentially complete or incomplete pathways between MC sources and receptors at the MRA. The potential for MC at the MRA results from weathering or physical removal of munitions debris or MC in surface or subsurface soil. Potential MC associated with munitions use at the Pistol and Machine Gun Range (SR891) includes lead.

8.2.1 Soil Exposure Pathway Analysis

MC may be released directly to soil during the initial deposition activity, or MC may be released to soil through weathering and/or removal of MEC or munitions debris.

Lead was detected in surface and subsurface soil samples above the background UTL calculation at the Pistol and Machine Gun Range (SR891). Surface and subsurface soil results at the Pistol and Machine Gun Range (SR891) exceeded human health and ecological screening criteria, and therefore are valid soil exposure pathways for consideration.

8.2.1.1 Soil Exposure Receptors

Appropriate human and ecological receptors to soil (surface and subsurface) were selected for the Pistol and Machine Gun Range (SR891) based on site-specific conditions. Human receptor subcategories that are considered for this evaluation includes: current and future site workers, current and future construction workers, future recreational users, and future residents.

Surface and subsurface soil exposure pathways are considered potentially complete for human receptors at the Pistol and Machine Gun Range (SR891). Potential surface and subsurface soil receptors that may incidentally ingest, inhale, or come into dermal contact with surface and subsurface soil at the Pistol and Machine Gun Range (SR891) include the following:

- Current and future site workers and construction workers
- Future recreational users
- Future residents

The MRA is located in an area of the installation with a relatively low level of recent development (zoned light industrial). The main floor of the old range is covered with grass, which is mowed periodically. The three bermed sides of the range are wooded and border wooded areas. Since the habitat associated with this MRA could accommodate wildlife and there are threatened species noted in the Atlantic County area (**Section 5.4.1**), biota is considered a potential receptor at this MRA.

8.2.1.2 Soil Exposure Conclusions

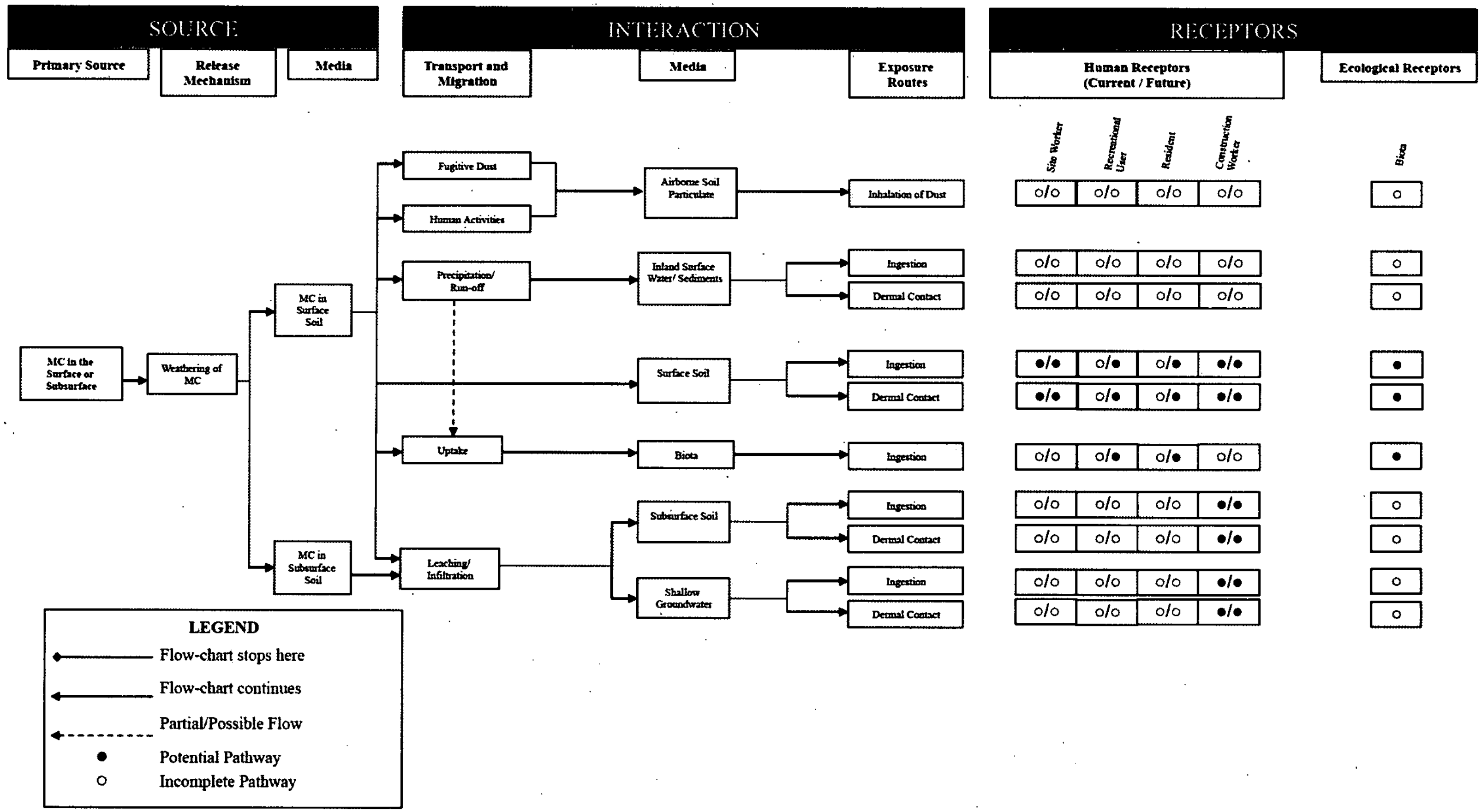
A potentially complete exposure pathway does exist whereby current and future site workers and construction workers, and potential future recreational users and residents may be exposed to possible MC-impacted surface and subsurface soil (where present) at the Pistol and Machine Gun Range (SR891). A potentially complete exposure pathway also exists whereby biota may be exposed to possible MC-impacted surface soil at the Pistol and Machine Gun Range (SR891).

TABLE 8-1
MC CONCEPTUAL SITE MODEL (TABULAR) FOR PISTOL AND MACHINE GUN RANGE (SR891) MRA

MRA Name and MRA ID	Cohort Designation	Source: Primary Source	Source: Release Mechanism - Potential Contamination	Source: Secondary Source	Interaction: Transport and Migration	Interaction: Exposure Media / Route	Potential Receptors: Human: Current	Potential Receptors: Human: Future	Potential Receptors: Ecological
Pistol and Machine Gun Range (SR891)	Small Arms Ranges (Cohort Category A)	MC in the Surface and Subsurface	Weathering of MC	MC in Surface Soil	Fugitive Dust, Human Activities	Airborne Soil Particulate / Inhalation of Dust	None	None	None
				MC in Surface Soil	NA	Surface Soil / Ingestion or Dermal Contact	Site Worker, Construction Worker	Site Worker, Recreational User, Resident, Construction Worker	Biota
				MC in Surface Soil	Precipitation and Run-Off	Inland Surface Water and Sediments / Ingestion or Dermal Contact	None	None	None
				MC in Surface Soil	Uptake	Biota / Ingestion	None	Recreational User, Resident	Biota
				MC in Surface and Subsurface Soil	Leaching/Infiltration	Subsurface Soil / Ingestion or Dermal Contact	Construction Worker	Construction Worker	None
				MC in Surface and Subsurface Soil	Leaching/Infiltration	Shallow Groundwater / Ingestion or Dermal Contact	Construction Worker	Construction Worker	None

Notes:
AGS = Air Guard Station
IAP = International Airport
ID = identification
MC = munitions constituents
MRA = munitions response area
NA = not applicable
None = incomplete pathway

FIGURE 8-1
MC CONCEPTUAL SITE MODEL (GRAPHICAL) FOR PISTOL AND MACHINE GUN RANGE (SR891)



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Section 9

This section presents the results of the human health risk screening evaluation that was completed for the Pistol and Machine Gun Range (SR891) MRA at Atlantic City IAP AGS.

9.1 GENERAL APPROACH

A human health risk screening evaluation was completed to assess potential adverse impacts to human health or risks associated with current or future receptor exposures to MC and munitions-related contamination in surface and subsurface soils at the Pistol and Machine Gun Range (SR891).

9.1.1 Human Health Screening Levels

Sample results generated during the CSE Phase II activities at Atlantic City IAP AGS were compared to human health screening levels and background levels to determine if contaminant releases have occurred at concentrations exceeding levels of potential concern. NJDEP uses USEPA RSLs for human health evaluations (USEPA 2012). The human health risk screening evaluation results are presented on **Tables 9-1** and **9-2**.

9.1.2 Background Levels

As described in **Section 4.4.3**, a background study for lead in soil was completed at Atlantic City IAP AGS during the CSE Phase II. The background levels are summarized in **Table 4-4**, and the data are presented in **Appendix J**.

9.2 PATHWAYS AND RECEPTORS

Potential receptors at the Pistol and Machine Gun Range (SR891) include current and future site workers and construction workers, and potential future recreational users and residents.

9.3 MEDIA SCREENING RESULTS

Maximum chemical concentrations detected in soil and groundwater at the Pistol and Machine Gun Range (SR891) were compared to human health screening and background levels. Chemical concentrations that exceeded both the human health screening and background levels were considered to exceed the human health screening criteria.

9.3.1 Pistol and Machine Gun Range (SR891)

Surface soil, subsurface soil and groundwater were collected at this MRA for analysis. The human health screening results for these media are summarized below.

9.3.1.1 Surface Soil Screening

A total of 182 surface soil samples were collected and analyzed for lead. The lead concentrations of 69 surface soil samples (maximum of 31,965 ppm) exceeded the human health screening criteria for lead (400 mg/kg). **Table 9-1** presents the results of the human health risk screening evaluation for surface soil.

9.3.1.2 Subsurface Soil Screening

A total of 187 subsurface soil samples were collected and analyzed for lead with 41 lead samples exceeding the human health screening criteria. **Table 9-2** presents the results of the human health risk screening evaluation for subsurface soil.

9.3.1.3 Human Health Risk Evaluation Conclusions

Based on the results of the human health risk screening evaluation, surface and subsurface soil at the Pistol and Machine Gun Range (SR891) is impacted by MC concentrations greater than the human health screening criteria and could potentially pose a risk to current and future site workers and construction workers, and potential future recreational users and residents.

9.3.1.4 Groundwater

One groundwater sample was collected near the highest surface sample result (SR891-EX095-SS-0.5) location and analyzed for lead. The result was 83 ug/L (ppb) for lead. USEPA's soil screening level (SSL) for the protection of groundwater is 14 mg/kg. This level is presented in USEPA's May 2012 version of the RSL Table and is back-calculated from Maximum Contaminant Level of 15 ug/L and conservatively assumes a default dilution attenuation factor (DAF) of 1.

TABLE 9-1
SCREENING LEVEL HUMAN HEALTH RISK EVALUATION FOR SURFACE SOIL
PISTOL AND MACHINE GUN RANGE (SR891)

Chemical	Frequency Detected	Maximum Detected Concentration (mg/kg)[1]	Qual	Screening Level (mg/kg)	Source	Number of Samples Above Screening Level	Background [2] (mg/kg)	Above Background Level (Yes or No)	Above Screening Criteria (Yes or No/ Rationale)
Lead by XRF (ppm)									
Lead	**180 / 182**	**31965**		**400**	**RSL**	**69**	**18.71**	**Yes**	**Yes / A**

Sources:
RSL – Regional Screening Levels, May (USEPA 2012)

Notes:
[1] Maximum concentration detected in surface soil samples collected at Pistol and Machine Gun Range (SR891) during CSE Phase II field activities.
[2] Atlantic City IAP AGS Background Levels (**Table 4-4**)

Bold	The maximum concentration exceeded the human health screening level.

Rationale:
A = Exceeds Screening Level and Background
B = Does Not Exceed Screening Level
C = Does Not Exceed Background
D = No Toxicity Data

AGS = Air Guard Station
CSE = Comprehensive Site Evaluation
mg/kg = milligrams per kilogram
ppm = parts per million

Qual = qualifier
XRF = X-ray fluorescence

TABLE 9-2
SCREENING LEVEL HUMAN HEALTH RISK EVALUATION FOR SUBSURFACE SOIL
PISTOL AND MACHINE GUN RANGE (SR891)

Chemical	Frequency Detected	Maximum Detected Concentration (mg/kg)[1]	Qual	Screening Level (mg/kg)	Source	Number of Samples Above Screening Level	Background[2] (mg/kg)	Above Background Level (Yes or No)	Above Screening Criteria (Yes or No/ Rationale)
Lead by XRF (ppm)									
Lead	**185 / 187**	**9500**		**400**	**RSL**	**41**	**-**	**-**	**Yes / A**

Sources:
RSL – Regional Screening Levels, May (USEPA 2012)

Notes:
[1] Maximum concentration detected in subsurface soil samples collected at Pistol and Machine Gun Range (SR891) during CSE Phase II field activities.
[2] Atlantic City IAP AGS Background Levels (**Table 4-4**), applicable to surface soil

Bold The maximum concentration exceeded the human health screening level.

Rationale:
A = Exceeds Screening Level
B = Does Not Exceed Screening Level
C = Does Not Exceed Background
D = No Toxicity Data

- = undetermined value or not applicable
AGS = Air Guard Station
CSE = Comprehensive Site Evaluation
mg/kg = milligrams per kilogram

ppm = parts per million
Qual = qualifier
XRF = X-ray fluorescence

Section 10

Section 10

This section presents the results of the ecological risk screening evaluation that was completed for the Pistol and Machine Gun Range (SR891) MRA at Atlantic City IAP AGS.

10.1 GENERAL APPROACH

An ecological risk screening evaluation was completed to assess potential adverse impacts to habitat with potential current or future ecological receptor exposures to MC in surface soil at the Pistol and Machine Gun Range (SR891).

10.1.1 Ecological Screening Levels

For ecological screening, chemicals with detected concentrations above the selected screening level will be identified as COPECs warranting further evaluation. The sources and hierarchy of selection of the ecological screening levels are as follows:

- Background Data (CSE Phase II).
- Surface Soil – USEPA, EcoSSL, 2005.

Sample results generated during the CSE Phase II activities at Atlantic City IAP AGS were compared to ecological screening levels and background levels to determine if contaminant releases have occurred at concentrations exceeding levels of potential concern. The USEPA EcoSSL for lead (11 mg/kg) was used for this evaluation. The ecological risk screening evaluation results are presented on **Table 10-1**.

10.1.2 Background Levels

As described in **Section 4.4.3**, a background study for lead in soil was completed at Atlantic City IAP AGS during the CSE Phase II. The background levels are summarized in **Table 4-4**, and the data are presented in **Appendix J**.

10.2 HABITAT AND RECEPTORS

The majority of the Atlantic City IAP lies within the Pinelands National Reserve. This land is protected comprising approximately one-third of New Jersey and is regulated so as to "preserve, protect, and enhance the natural and cultural resources of the Pinelands National Reserve, and to encourage compatible economic and other human activities consistent with that purpose." Also, within the Atlantic City IAP boundary are regulated tidelands and Natural Heritage Priority lands. Natural Heritage Priority sites are lands set aside by the NJDEP to identify naturally significant areas within the state (Parsons, 2007).

The Pistol and Maching Gun Range (SR891) is located in an area of the installation zoned "light industrial". Since the habitat associated with the Pistol and Machine Gun Range (SR891) could accommodate wildlife and there are threatened species designated in Atlantic County, biota is considered a potential receptor.

10.3 MEDIA SCREENING RESULTS

Based on the results of the ecological risk screening evaluation, surface soil at the Pistol and Machine Gun Range (SR891) are impacted by MC concentrations greater than the ecological screening criteria and background. Atlantic City IAP AGS is within the range of several federally designated threatened, endangered, or of special status species and suitable habitat is present within the MRA. Therefore, ecological exposure pathways to surface soil are potentially present.

TABLE 10-1
SCREENING LEVEL ECOLOGICAL RISK EVALUATION FOR SURFACE SOIL PISTOL AND MACHINE GUN RANGE (SR891)

Chemical	Frequency Detected	Maximum Detected Concentration (mg/kg)[1]	Qual	Screening Level (mg/kg)	Source	Number of Samples Above Screening Level	Background [2] (mg/kg)	Above Background Level (Yes or No)	Above Screening Criteria (Yes or No/ Rationale)
Lead by XRF (ppm)									
Lead	**180 / 182**	**31965**		**11**	**USEPA**	**179**	**18.71**	**Yes**	**Yes / A**

Sources:
USEPA – USEPA, Ecological Soil Screening Level (EcoSSL), 2005.

Notes:
[1] Maximum concentration detected in surface soil samples collected at Pistol and Machine Gun Range (SR891) during CSE Phase II field activities.
[2] Atlantic City IAP AGS Background Levels (**Table 4-4**)

Bold	The maximum concentration exceeded the ecological screening level.

Rationale:
A = Exceeds Screening Level and Background
B = Does Not Exceed Screening Level
C = Does Not Exceed Background
D = No Toxicity Data

AGS = Air Guard Station
CSE = Comprehensive Site Evaluation
mg/kg = milligrams per kilogram

ppm = parts per million
Qual = qualifier
XRF = X-ray fluorescence

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Section 11

This section discusses application of the MRSPP for the Pistol and Machine Gun Range (SR891). The MRSPP was applied in accordance with 32 Code of Federal Regulation (CFR) Part 179 and the guidance provided in the DoD MRSPP Draft Primer (DoD 2007). The MRSPP worksheet tables for the MRA at Atlantic City IAP AGS are included in **Appendix K**.

In 2005, DoD published the MRSPP as a Federal Rule (32 CFR Part 179) to assign a relative priority to each defense site in the MMRP Inventory for response activities. These response activities are based on the overall conditions at each MRA or MRS, taking into consideration various factors related to explosive safety and environmental hazards. The application of the MRSPP applies to all locations:

- That are or were owned, leased to, or otherwise possessed or used by DoD
- That are known to or are suspected of containing MEC or MC
- That are included in the MMRP Inventory

In assigning a relative priority for response activities, DoD generally considers MRAs posing the greatest hazard as being the highest priority. In the USAF MMRP, the MRSPP priority will be one factor in determining the sequence in which munitions response actions are funded. Stakeholder input is also considered when determining the MRSPP priority for each MRS. The following sections briefly summarize the MRSPP modules and the results of the evaluations for the MRA at Atlantic City IAP AGS.

11.1 EXPLOSIVE HAZARD EVALUATION MODULE

The EHE module assesses the explosive hazards of a site based on the known or suspected presence of an explosive hazard. The EHE module is composed of three factors, each of which has two to four data elements that are intended to assess the specific conditions at an MRS. Based on site-specific information, each data element is assigned a numeric score. The sum of these values is the EHE module score used to determine the corresponding EHE module rating. The data elements are as follows:

- **Explosive Hazard Factor –** has the data elements *Munitions Type* and *Source of Hazard* and constitutes 40 percent of the EHE module score.
- **Accessibility Factor –** has the data elements *Location of Munitions*, *Ease of Access*, and *Status of Property* and constitutes 40 percent of the EHE module score.
- **Receptor Factor –** has the data elements Population Density, Population Near Hazard, Types of Activities/Structures, and Ecological and/or Cultural Resources and constitutes 20 percent of the EHE module score.

The Pistol and Machine Gun Range MRS (SR891) received the EHE module rating of "G," which corresponds to MRSPP priority of "8." The EHE module rating was based primarily on the historical use of the MRA as a small arms range.

The worksheet tables are presented in **Appendix K** and summarized in **Table 11-1**.

11.2 CHEMICAL WARFARE MATERIEL HAZARD EVALUATION MODULE

The CHE module provides an evaluation of the chemical hazards associated with the physiological effects of CWM. The CHE module is used only when CWM in the form of MEC or MC is known or suspected to be present at an MRA or MRS. Like the EHE module, the CHE module has three factors, each of which has two to four data elements that are intended to assess the conditions at an MRA or MRS. These factors are as follows:

- **CWM Hazard Factor** – has the data elements *CWM Configuration* and *Sources of CWM* and constitutes 40 percent of the CHE score.
- **Accessibility Factor** – focuses on the potential for receptors to encounter the CWM known or suspected to be present on an MRA. This factor consists of three data elements, *Location of CWM, Ease of Access*, and *Status of Property* and constitutes 40 percent of the CHE score.
- **Receptor Factor** – focuses on the human and ecological populations that may be impacted by the presence of CWM. It has the data elements *Population Density, Population Near Hazard, Types of Activities/Structures*, and *Ecological and/or Cultural Resources* and constitutes 20 percent of the CHE score.

Similar to the EHE module, each data element is assigned a numeric value, and the sum of these values is the CHE module score used to determine the corresponding CHE module rating. If CWM is not known or suspected, the CHE module rating is "No Known or Suspected CWM Hazard."

The Pistol and Machine Gun Range (SR891) received the alternative CHE module rating of "No Known or Suspected CWM Hazard." This rating was assigned due to no physical evidence being found during the CSE Phase I and Phase II activities to indicate CWM was present at the MRA.

The worksheet tables are presented in **Appendix K** and summarized in **Table 11-2**.

11.3 HEALTH HAZARD EVALUATION MODULE

The HHE module provides a consistent DoD-wide approach to evaluate the potential human health and environmental hazards posed by contaminants (i.e., MC) present at an MRA or MRS. The module has three factors that are as follows:

- **Contamination Hazard Factor (CHF)** – evaluates potential risk posed by contaminants and contributes a level of *High (H), Medium (M),* or *Low (L)* based on *Significant, Moderate,* or *Minimal* contaminants present, respectively.
- **Migration Pathway Factor (MPF)** – assesses the potential for MC or incidental contaminants to migrate from an MRA or MRS and contributes a level of *H, M,* or *L* based on *Evident, Potential,* or *Confined* pathways, respectively.

- **Receptor Factor (RF)** – evaluates the presence of receptors who may be exposed and contributes a level of *H, M,* or *L* based on *Identified, Potential,* or *Limited* receptors, respectively.

The HHE builds on the DoD Relative Risk Site Evaluation framework that is used in the Installation Restoration Program. The CHF, RF, and MPF are based on quantitative evaluation of MC and/or CERCLA hazardous substances and a qualitative evaluation of pathways and human receptors in surface soil, groundwater, surface water, and sediment. Ecological receptors in surface water and sediment are also evaluated. The HHE does not address subsurface soils. In addition, the HHE does not consider air as a pathway, because the risk through this medium from DoD MMRP sites with soil contamination is generally minimal.

The H, M, and L levels for the CHF, RF, and MPF are combined in a matrix to obtain composite three-letter combination levels that integrate considerations of all three factors. The three-letter combination levels are organized by frequency and the combination of the frequencies results in the HHE module rating.

The Pistol and Machine Gun Range (SR891) received the HHE combination level of MMM and an HHE module rating of D, which corresponds to an MRSPP priority of 5. The HHE module rating was based on the groundwater rating with a concentration of lead greater than the human health screening criteria and the soil rating with a concentration of lead greater than the human health screening criteria.

The HHE module worksheet tables are presented in **Appendix K** and summarized in **Table 11-3**.

11.4 MRSPP PRIORITY SCORES

In accordance with the DoD MRSPP Primer (DoD 2007), each applicable MRS is assigned an MRSPP Priority ranging from 1 to 8 **(Table 11-4)**. Priority 1 indicates the highest potential hazard, and Priority 8 indicates the lowest potential hazard. Only a site with a potential Chemical Warfare Hazard can receive a Priority of 1. The priority is determined by selecting the highest rating from among the EHE, CHE, and HHE modules. For example, if the EHE rating is 2, the CHE rating is 5, and the HHE rating is 4, the priority assigned would be 2. The priority will be used to determine the future funding sequence of MRAs for further munitions response action.

For the Pistol and Machine Gun Range (SR891), the EHE module rating was G, which corresponds to an MRSPP priority of 8. The CHE module rating was No Known or Suspected CWM Hazard. The HHE module rating was D, which corresponds to an MRSPP priority of 5. Therefore, the MRS was assigned an overall MRSPP priority of 5 based on the HHE module rating.

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TABLE 11-1
SUMMARY OF EHE MODULE RATINGS

MRS Name	Explosive Hazard Factor	Accessibility Factor	Receptor Factor	EHE Combination Level	Total EHE Module Rating
Pistol and Machine Gun Range (SR891)	3	9	13	25	**G (8)**

Notes:
EHE = Explosive Hazard Evaluation
MRS = munitions response site

TABLE 11-2
SUMMARY OF CHE MODULE RATINGS

MRS Name	CWM Hazard Factor	Accessibility Factor	Receptor Factor	CHE Combination Level	Total CHE Module Rating
Pistol and Machine Gun Range (SR891)	—	—	—	—	NKSH

Notes:
CHE = CWM Hazard Evaluation
CWM = Chemical Warfare Materiel
MRS = munitions response site
NKSH = No Known Or Suspected Hazard

TABLE 11-3
SUMMARY OF HHE MODULE RATINGS

MRS Name	Contaminant Hazard Factor	Migration Pathway	Receptor Factor	HHE Combination Level	Total HHE Module Rating
Pistol and Machine Gun Range (SR891)	M	M	M	MMM	**D (5)**

Notes:
HHE = Health Hazard Evaluation
MC = munition constituent
MRS = munitions response site

TABLE 11-4
MRSPP PRIORITIES

MRS Name	EHE Module Rating	CHE Module Rating	HHE Module Rating	MRSPP Priority
Pistol and Machine Gun Range (SR891)	G (8)	NKSH	D (5)	**5**

Notes:
CHE = CWM Hazard Evaluation
EHE = Explosive Hazard Evaluation
HHE = Health Hazard Evaluation
MRS = munitions response site
MRSPP = munitions response site prioritization protocol
NKSH = no known or suspected hazard

Section 12

Perchlorate was not identified as a potential MC for the Pistol and Machine Gun Range (SR891) at Atlantic City IAP AGS and, therefore, was not evaluated during the CSE Phase II investigation.

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Section 13

This section summarizes results obtained and conclusions reached as a result of the CSE Phase II activities completed at Atlantic City IAP AGS. The most significant findings are summarized in this section and are reproduced directly or abstracted from information contained in this report. The conclusions provide general and comparative interpretations of the findings, in terms of the general objectives of the USAF CSE Phase II program.

13.1 SUMMARY OF CSE PHASE II ACTIVITIES

This CSE Phase II compiled and evaluated information about Atlantic City IAP AGS relating to the possible presence of MEC and associated contamination of environmental media from MC. The CSE Phase II activities included visual surveys, XRF analyses, and environmental media sampling. This information was reviewed and used to develop and refine the CSMs for potential exposures to MEC and MC for the Pistol and Machine Gun Range (SR891) MRA at Atlantic City IAP AGS. The CSMs related the potential sources of MEC and MC to potential human and ecological exposures at the MRA in consideration of current and projected future land uses. These potentially complete exposure pathways also considered the possible transport or migration of MEC items as the result of natural processes or human activities, as well as impacts associated with migration of MC contaminants associated with MEC. Land use scenarios were evaluated with respect to how human and ecological receptors would interact with the land and water bodies at Atlantic City IAP AGS. The compiled information was then used to complete an assessment of the potential explosive and environmental hazards of the Pistol and Machine Gun Range (SR891) MRA through application of the MRSPP.

13.2 SUMMARY OF THE CSE PHASE II FINDINGS

The CSE Phase II resulted in the collection, evaluation, and synthesis of a large amount of information regarding past military munitions-related activities at Atlantic City IAP AGS, current on-site conditions with respect to the presence of MEC and MC, physical setting of the MRA, and plans for the future use of the property. A summary of the findings for the Pistol and Machine Gun Range (SR891) MRA is provided below.

13.2.1 Pistol and Machine Gun Range (SR891) Summary of the CSE Phase II Findings

- **Type**: Small Arms Range
- **Size**: 1.7 acres
- **Topography**: Flat
- **Vegetative Cover**: Grass, some small trees/shrubs
- **Soil Type**: Silty Loam/Sand
- **Features**: U-shaped earthen berm, target stands and firing points remain
- **MEC/Munitions Debris**: No MEC was identified at this MRA. Small arms debris (lead projectiles, cartridge casings, and shotgun shells) were located on the surface of the MRA and in subsurface soils.

- **Anomaly Density**: Not applicable
- **Evidence of HE Found**: None
- **Access**: General Base access, chain-link fence
- **Sampled Media**: Surface and subsurface soils and groundwater
- **Media Impacted Above Screening Levels**: Lead was detected above residential human health screening criteria in surface soils, subsurface soils, and groundwater, and above ecological screening criteria in surface soils.
- **Ownership**: DoD (Responsible Party)

13.3 ASSESSMENT OF POTENTIAL MUNITIONS CONSTITUENT RELEASES

Based on the findings of this CSE Phase II, MC releases indicate action is warranted for the Pistol and Machine Gun Range (SR891) MRA. Samples were collected from potentially impacted media (e.g., surface soil, subsurface soil, and groundwater) at locations where potential releases or migration of MEC or MC, if present, would be anticipated to occur. These focused sampling efforts investigated worst-case scenario MC impacts.

Section 14

Section 14

This section discusses the current MRA cohort assignment, process streamlining opportunities that have been identified, MRS subdivision and footprint changes if necessary, recommended future response actions, CSM gap evaluation, DoD MRSPP Priority, and site sequencing.

14.1 COHORT ASSIGNMENT

To comply with USAF Knowledge Driven/Performance-Based Management initiative, the MRAs are subdivided into seven "cohorts." The assignment of an MRA to different cohorts supports the streamlining of the restoration process, including the development and implementation of presumptive remedies for specific cohort types. The cohort type will be reflected in the site description in EESOH-MIS. The seven USAF MMRP cohorts are shown in **Table 14-1**.

TABLE 14-1
USAF MMRP COHORT ASSIGNMENTS

Cohort Type	Cohort Description
A	Small Arms Ranges (SAR)
B	Boresight Ranges
C	Explosive Ordnance Disposal (EOD) Ranges and Open Burn/Open Detonation (OB/OD) Sites
D	Chemical Warfare Materiel (CWM) Sites
E	Pyrotechnic/Practice Sites
F	All Other Sites
G	Munitions Constituents

As the USAF MMRP evolves, the cohort assignments may be expanded or consolidated to reflect what has been learned about MRAs. In implementing the CSE Phase I, the cohort type was defined by the range-type, as designated in the documentation. The cohort assignment will be further refined based on field investigation in future phases. Any MRA with a site description of "multi-use" in EESOH-MIS shall be assigned a site description that reflects a specific cohort. The site description will be revised to the range-type designated in documentation. Reassignments of cohort or site descriptions may be required in the future and will be based on the types of munitions found during future fieldwork.

The cohort type recommended for the Atlantic City IAP AGS MRA is as follows:

- Pistol and Machine Gun Range (SR891): "A" for Small Arms Range

14.2 PROCESS STREAMLINING OPPORTUNITIES

Process streamlining opportunities for Atlantic City IAP AGS included involving the regulators early in the planning process with review of documents and field sampling locations. In addition, the sampling program was developed such that a decision process was established and exit points were clearly defined for the stakeholders.

Unacceptable risks were associated with MC and/or munitions-related contamination at the Atlantic City IAP AGS based on the CSE Phase II surface soil, subsurface soil and groundwater sampling results exceeding residential human health screening criteria, and ecological screening criteria in surface soils. Therefore, based on data gaps associated with the potential for PAHs in soil and lead in groundwater, as well as potentially complete ecological exposure pathways for surface soil, subsurface soil, and groundwater at the Pistol and Machine Gun Range (SR891), it is recommended that the MRS be moved to the remedial investigation/feasibility study (RI/FS) phase.

14.3 ADDITIONAL MRS DESIGNATIONS (SPLITTING THE MRA)

Based on information gathered during the CSE Phase I and Phase II investigations and depending on site-specific factors, each MRA or MRS may be designated as a single MRS or may be subdivided into multiple MRSs for the purposes of evaluation and response, where appropriate. Subdividing MRAs or MRSs into multiple MRSs may allow for more efficient characterization so that munitions responses specific to local conditions can be conducted.

An MRA must be comprised of at least one MRS, but may contain multiple MRSs. The total area of all MRSs contained within an MRA must, however, equal the area of the MRA. This will ensure that the total acreage within an MRA is investigated during the CSE Phases I and II. Typical site-specific factors that may be considered during subdivision of MRAs into MRSs include:

- The prevalence of MEC or the extent of MC-contaminated media present within different areas of the MRA
- The type of MEC or MC present within the MRA
- Physical features (vegetation, topography, land areas versus water bodies, accessibility, and location of receptors that may be potentially exposed to MEC, etc.)
- Geological and hydrogeological characteristics

The CSE Phase II investigation started with the acreage developed from the previous investigation (i.e., the CSE Phase I). The data from that report shows that the Pistol and Machine Gun Range (SR891) was 5.4 acres; however, that acreage was obtained from an Archive Search Report (USACE 1996) on the Pistol and Machine Gun Range which included a Skeet Range located north of the Pistol and Machine Gun Range. The Skeet Range (FUDS project number C02NJ097705) was removed from the Air Force MMRP and there is no indication of overlap of the two ranges. The specific acreage for the Pistol and Machine Gun Range (SR891) was reported as "unknown" in the CSE Phase I Report. Additionally, according to NGB/A7OR, the Report to Congress errantly reflected a size of 8.5 acres for the Pistol and Machine Gun Range (SR891). It is recommended that the Pistol and Machine Gun Range MRS (SR891) (8.5 acres reported to Congress) be subdivided into two separate MRSs, the Pistol and Machine Gun Range MRS (SR891) and the Pistol and Machine Gun Range (Administrative Closure) MRS (SR891A). This subdivision will allow the acreage associated with the Pistol and

Machine Gun Range MRS (SR891) to move forward to the RI/FS phase, while the Pistol and Machine Gun Range (Administrative Closure) MRS (SR891A) will be recommended for administrative closure.

The following changes are recommended:

- Pistol and Machine Gun Range (SR891) MRS, 1.7 acres (**Figure 14-1**)
- Pistol and Machine Gun Range (SR891A) MRS, administratively closeout 6.8 acres

14.4 CHANGES TO MRA/MRS FOOTPRINTS

The data for the MRS at Atlantic City IAP AGS were evaluated to determine if changes to the footprint (area) were required. The CSE Phase I investigation results did not provide a boundary for the Pistol and Machine Gun Range (SR891) footprint, but described the size as 5.4 acres. Additionally, according to NGB/A7OR, the Report to Congress errantly reflected a size of 8.5 acres for the Pistol and Machine Gun Range (SR891). Based on the CSE Phase II results, the MRA boundary was reduced to 1.7 acres and encompasses the entire footprint of the three-sided earthen berm structure.

14.5 FUTURE RESPONSE ACTIONS AND OBJECTIVES

Based on the results of the CSE Phase II, it is concluded that the Pistol and Machine Gun Range MRS (SR891) at Atlantic City IAP AGS has been sufficiently characterized. No surface evidence of MEC associated with historical range activities was present. Significant MC impacts have been identified at the Pistol and Machine Gun Range MRS (SR891). The following future response actions are recommended:

- Recommend moving to RI/FS at the Pistol and Machine Gun Range MRS (SR891) based on data gaps associated with the potential for PAHs in soil and lead in groundwater, as well as the potentially complete ecological exposure pathways for surface soils, subsurface soils, and groundwater.

A summary of the CSE Phase II results and recommendations are presented in **Table 14-2**.

14.6 IDENTIFY GAPS IN CSM

The CSM for the Pistol and Machine Gun Range MRS (SR891) is well defined for lead in soils. Clay target debris was not anticipated to be present on the Pistol and Machine Gun Range MRS (SR891) and therefore, sampling for PAHs was not planned. However, small amounts of clay target debris were observed on the surface of the backstop berm. Due to this observation, a potential data gap exists for PAHs. This data gap would be investigated during the RI/FS where clay target debris was encountered.

Additionally, one groundwater sample (and duplicate) was collected adjacent to the soil sample locations that exhibited the greatest exceedance of the CSE Phase II human health screening criteria and submitted to the laboratory for dissolved lead analysis. The sample results exceeded the human health screening levels for lead in groundwater. Due to the elevated results and potentially complete exposure pathway, a data gap exists for lead in groundwater. This data gap would be investigated during the RI/FS.

14.7 DOD MRSPP PRIORITY

The DoD MRSPP priority score for the Pistol and Machine Gun Range MRS (SR891) was 5.

14.8 SITE SEQUENCING CONSIDERATIONS

Based on the CSE Phase II results, further investigation in the form of an RI/FS is recommended for the Pistol and Machine Gun Range MRS (SR891) and administrative closure is recommended for Pistol and Machine Gun Range (Administrative Closure) MRS (SR891A).

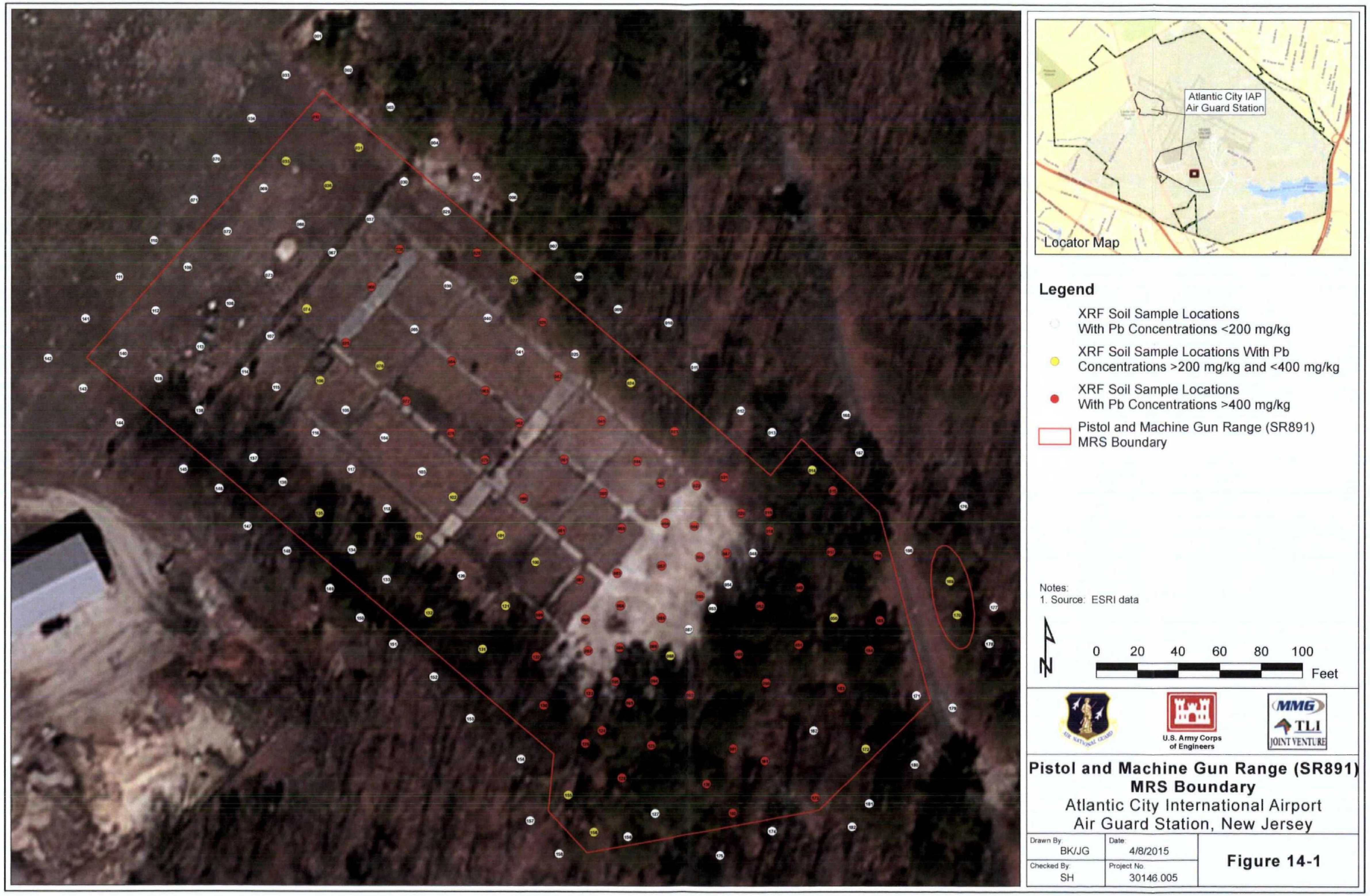
Atlantic City IAP
Air Guard Station
Locator Map
Legend
XRF Soil Sample Locations
With Pb Concentrations <200 mg/kg
XRF Soil Sample Locations With Pb
Concentrations >200 mg/kg and <400 mg/kg
XRF Soil Sample Locations
With Pb Concentrations >400 mg/kg
Pistol and Machine Gun Range (SR891)
MRS Boundary
Notes:
1. Source: ESRI data
N
0 20 40 60 80 100
Feet
U.S. Army Corps
of Engineers
MMG
TLI
JOINT VENTURE
Pistol and Machine Gun Range (SR891)
MRS Boundary
Atlantic City International Airport
Air Guard Station, New Jersey
Drawn By: BK/JG
Date: 4/8/2015
Checked By: SH
Project No. 30146.005
Figure 14-1

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TABLE 14-2
CONCLUSIONS AND RECOMMENDATIONS

MRS	CSE Phase II Conclusions	Recommendations
Pistol and Machine Gun Range (SR891)	**MEC Results**: No MEC was identified at the MRS. Small arms debris was located on the surface and in the subsurface soils. **MC Results**: Lead results were above relevant screening criteria for surface soil (31,965 ppm maximum), subsurface soil (9,500 ppm maximum), and for groundwater (83 ug/L). **Human Health Risk Screening Results**: Based on the results of the human health risk screening evaluation, soil and groundwater media at the Pistol and Machine Gun Range (SR891) are impacted by MC concentrations greater than the human health screening criteria and could potentially pose a risk to current and future site workers and construction workers, as well as future recreational users and residents. **Ecological Risk Screening Results**: A potentially complete exposure pathway exists whereby biota may be exposed to possible MC-impacted surface soil, subsurface soil, and groundwater at the Pistol and Machine Gun Range (SR891) MRA. **Acres**: 1.7	Move to RI/FS
Pistol and Machine Gun Range (Administrative Closure) (SR891A)	Acres: 6.8	Administrative Closure

Notes:
MC = munitions constituents
MEC = munitions and explosives of concern
MRS = munitions response site
ppm = parts per million

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Appendix A

Definitions were obtained from the Air Force Guide for Conducting the Comprehensive Site Evaluation Phase II at Air Force Munitions Response Areas, Version 4.0 (USAF 2006).

Anomaly – Any identified Subsurface mass that may be geologic in origin, unexploded ordnance (UXO), or some other man-made material. Such identification is made through geophysical investigation and reflects the response of the sensor used to conduct the investigation (Handbook on the Management of Munitions Response Actions, Interim Final, EPA, May 2005).

Anomaly Avoidance – Techniques employed on property known or suspected to contain unexploded ordnance, other munitions that may have experienced abnormal environments (e.g., discarded military munitions), munitions constituents in high enough concentrations to pose an explosive hazard, or chemical agents, regardless of configuration, to avoid contact with potential surface or Subsurface explosive or Chemical Agent (CA) hazards, to allow entry to the area for the performance of required operations (AF Manual 91-201 and DOD 6055.9-STD).

Applicable or Relevant and Appropriate Requirements – Applicable requirements are cleanup standards, standards of control, and other substantive environmental protection requirements promulgated under Federal or state environmental law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) site. Relevant and appropriate requirements are cleanup standards that, while not "applicable," address situations sufficiently similar to those encountered at a CERCLA site where their use is well suited to the particular site (40 CFR Part 300).

Chemical Agent – An agent that, through its chemical properties, produces lethal or other damaging effects on human beings, except that such term does not include riot control agents, chemical herbicides, smoke, and other obscuration materials. This definition is based on the definition of "chemical agent and munition" in 50 U.S.C. 1521(j)(1).

Chemical Warfare Materiel (CWM) – Items generally configured as a munition containing a chemical compound that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. CWM includes V- and G-series nerve agents or H-series (mustard) and L-series (lewisite) blister agents in other-than-munition configurations; and certain industrial chemicals (e.g., hydrogen cyanide [AC], cyanogen chloride [CK], or carbonyl dichloride [called phosgene or CG]) configured as a military munition. CWM does not include riot control devices, chemical defoliants and herbicides, industrial chemicals (e.g., AC, CK, or CG) not configured as a munition, smoke and other obscuration producing items, flame and incendiary producing items, or soil, water, debris or other media contaminated with low concentrations of chemical agents where no CA hazards exist (MRSPP, 32 CFR Part 179, October 2005).

CWM contains the following four subcategories:

1. CWM, explosively configured – All UXO or discarded military munitions (DMM) that contain a CA fill and any explosive component. Examples are M55 rockets with CA, the M23 V-Series Nerve Agent (VX) mine, and the M360 105-mm GB artillery cartridge.

1. CWM, nonexplosively configured – All UXO or DMM that contain a CA fill but that do not contain any explosive components. Examples are any chemical munitions that do not contain explosive components and VX or mustard agent spray canisters.
2. CWM, bulk container – All discarded (e.g., buried) non-munitions-configured containers of CA (e.g., a ton container) and CAIS K941, toxic gas set M-1 and K942, toxic gas set M-2/E11.
3. Chemical Agent Identification Sets (CAIS) – Military training aids containing small quantities of various CA and other chemicals. All forms of CAIS are scored the same in this rule, except CAIS K941, toxic gas set M-1; and CAIS K942, toxic gas set M-2/E11, which are considered forms of CWM, bulk container, due to the relatively large quantities of agent contained in those types of sets.

Closed Range – A military range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a component (MGDERP, September 2001).

Conceptual Site Model (CSM) – The CSM is a description of a site and its environment that is based on existing knowledge. It describes sources of MEC or hazardous, toxic, and radioactive waste at a site; actual, potentially complete, or incomplete exposure pathways; current or reasonably anticipated future land use; and potential receptors. The source-receptor interaction is a descriptive output of a CSM. The CSM serves as a planning instrument, a modeling and data interpretation aid, and a communication device among the Project Team.

Defense Sites – Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions (10 U.S.C. 2710(e)(1)).

Department of Defense Components – The Office of the Secretary of Defense (OSD), the Military Departments, the Defense Agencies, the Department Field Activities, and any other Department organizational entity or instrumentality established to perform a government function (MRSPP, 32 CFR Part 179, October 2005).

Discarded Military Munitions – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations (10 U.S.C. 2710(e)(2)).

Explosive Ordnance Disposal – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance. It may also include explosive ordnance that has become hazardous by damage or deterioration.

Explosive Ordnance Disposal (EOD) Personnel – Active duty military personnel of any military service branch that are trained in the detection, identification, field evaluation, safe rendering, recovery, and final disposal of explosive ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration (Handbook on the Management of Munitions Response Actions, Interim Final, EPA, May 2005).

Facility – A building, structure, or other improvement to real property, in relation to work classification (10 U.S.C. 2801).

Formerly Used Defense Sites (FUDS) – Facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to the contamination by hazardous substances. By the DoD Environmental Restoration Program (ERP) policy, the Formerly Used Defense Sites (FUDS) program is limited to those real properties that were transferred from DoD control prior to 17 October 1986. FUDS properties can be located within the 50 states, District of Columbia, territories, commonwealths, and possessions of the United States (FUDS Program Policy, ER 200 3-1, May 2004).

Hazardous Substance – (A) Any substance designated pursuant to Section 1321(b)(2)(A) of title 33, (B) any element, compound, mixture, solution, or substance designated pursuant to Section 9602 of this title, (C) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (42 U.S.C. 6921) but not including any waste the regulation of which under the Solid Waste Disposal Act (42 U.S.C. 6901 et seq.), has been suspended by Act of Congress), (D) any toxic pollutant listed under section 1317(a) of title 33, (E) any hazardous air pollutant listed under Section 112 of the Clean Air Act (42 U.S.C. 7412), and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to Section 2606 of Title 15. The term does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas) (CERCLA, 42 U.S.C. § 9601 et seq.).

Installation – As defined by the Restoration Management Information System (RMIS) Data Element Dictionary for a Federal Facility Identification (FFID), the FFID number is a unique identifier, assigned to an installation/property in RMIS. The 14-character aggregate string is used in RMIS as the key column for each data table and is used to track all associated records for each installation. An installation may have a single range or multiple ranges (and each range may have more than one site contained within its boundaries) and a single or multiple sites, not associated with a range (Management Guidance for the Defense Environmental Restoration Program, September 2001).

Land Use Controls (LUCs) – Physical, legal, or administrative mechanisms that restrict the use of, or limit access to, contaminated property in order to reduce risk to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to property, such as fences or signs. The legal mechanisms are generally the same as those used for institution controls (ICs) as discussed in the NCP. ICs are a subset of LUCs and are primarily legal mechanisms imposed to ensure the continued effectiveness of land use restrictions imposed as part of a remedial decision. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that may be used to ensure compliance with use restrictions (MGDERP, September 2001).

Material That Potentially Presents an Explosive Hazard (MPPEH) – Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris), or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions (DoD Instruction 4140.62, Management and Disposition of MPPEH, December 2004).

Military Installation – A base, camp, post, station, yard, center, or other activity under the jurisdiction of the Secretary of a Military Department, or, in the case of an activity in a foreign country, under the operational control of the Secretary of a military department or the Secretary of Defense, without regard to the duration of operational control (10 U.S.C. 2801).

Military Munitions – All ammunition products and components produced for or used by the Armed Forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, and demolition charges; and devices and components of any item thereof. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed (10 U.S.C. 101(e)(4)).

Military Range – Designated land and water areas set aside, managed, and used to research, develop, test, and evaluate military munitions, other ordnance, or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas (40 CFR 266.201).

Munitions and Explosives of Concern (MEC) – Military munitions that are 1) unexploded ordnance, as defined in 10 U.S.C. 101(e)(5); 2) abandoned or discarded, as defined in 10 U.S.C. 2710(e)(2); 3) MC (e.g., TNT, RDX) present in soil, facilities, equipment, or other materials in high enough concentrations so as to pose an explosive hazard (MRSPP, 32 CFR Part 179, October 2005).

Munitions Constituent (MC) – Any material that originates from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S.C. 2710(e)(4)).

Munitions Debris – Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal (DoD 6055.9-STD).

Munitions Response – Response actions, including investigation, removal actions, and remedial actions, to address the explosives safety, human health, or environmental risks presented by UXO, DMM, or MC or to support a determination that no removal or remedial action is required (MRSPP, 32 CFR Part 179, October 2005).

Munitions Response Area (MRA) – Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites (MRSPP, 32 CFR Part 179, October 2005).

Munitions Response Site (MRS) – A discrete location within an MRA that is known to require a munitions response (MRSPP, 32 CFR Part 179, October 2005).

Operational Range – A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities, or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities (10 U.S.C. 101(e)(3)).

Ordnance and Explosives (OE) – Military munitions that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, or buried. These include dud-fired UXO, soil presenting explosive hazards, and buildings with explosives residues that present explosion hazards. Note: The term OE has been replaced with the term MEC in more recent publications.

Other than Operational Range – A closed, transferred, or transferring range.

Pollutant and Contaminant – These terms include, but are not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term pollutant or contaminant shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas) (CERCLA, 42 U.S.C. § 9601 et seq.).

Range Activities – Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the Armed Forces in the use and handling of military munitions, other ordnance, and weapons systems (10 U.S.C. 101(3)(2)).

Range-Related Debris – Debris, other than munitions debris, collected from operational ranges or from former ranges (e.g., targets, military munitions packaging and crating material) (DoD 6055.9-STD).

Range Residue – Material, including but not limited to, parts and sections of practice bombs, artillery, small arms, mortars, projectiles, bombs, missiles, rockets, rocket mortars, targets, grenades, incendiary devices, experimental items, demolition devices, and any other material fired on or discovered on a range (AFI 13-212, Range Planning and Operations, August 2001).

Real Property – Real estate owned by the United States and under the control of the DoD. Includes lands, buildings, structures, utilities systems, improvements and appurtenances thereto. Includes equipment attached to and made part of buildings and structures (such as heating systems) but not moveable equipment (such as plant equipment) (MGDERP, September 2001).

Relative Risk – The evaluation of individual sites to determine high, medium, or low relative risk to human health and the environment, based on contaminant hazards, migration pathways and receptors, in accordance with the DoD's Risk-Based Site Evaluation Primer (MGDERP, September 2001).

Removal – The cleanup or removal of released hazardous substances from the environment. Such actions may be taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under Section 9604(b) of this title, and any emergency assistance which may be provided under the Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 et seq.) The requirements for removal actions are addressed in 40 CFR §§300.410 and 300.415. The three types of removals are emergency, time-critical, and non-time critical removals (CERCLA, 42 U.S.C. § 9601 et seq.).

There are three types of removals:

1) Emergency – Emergency removal or response is performed when an immediate or imminent danger to public health or the environment is present and action is required within hours. Trained responders identify the explosive threat and make the decision as

to whether the munitions and explosive of concern should be moved or blown in place and ensure the threat is removed safely and expeditiously.

2) Time-critical – A response to a release or threat of release that poses such a risk to public health (serious injury or death), or the environment, that cleanup or stabilization actions must be initiated within six months.

3) Non-time critical – An action initiated in response to a release or threat of a release that poses a risk to human health and welfare, or the environment. Initiation of removal cleanup actions may be delayed for six months or more.

Risk Reduction – The movement of any site from a higher to lower relative risk category as a result of natural attenuation, interim remedial, remedial, or removal actions taken (DoD Instruction 4715.7, Environmental Restoration Program, April 1996).

Scrap – Any item that has been inspected by a UXO/EOD Technician and designated to be in 5X condition (cleaned, decontaminated, and free of explosive safety hazard).

Site (as defined in the Restoration Management Information System Data Element Dictionary for a SITE ID) – A unique name given to a distinct area of an installation containing one or more releases or threatened releases of hazardous substances treated as a discreet entity or consolidated grouping for response purposes. Includes any building, structure, impoundment, landfill, storage container, or other site or area where a hazardous substance was or has come to be located, including formerly used sites eligible for building demolition/debris removal. Installations and ranges may have more than one site (MGDERP, September 2001).

Stakeholder – Groups or individuals who were interested in, concerned about, affected by, who had a vested interest in, or would be involved in the munitions response at an MRA/MRS.

Transferred Range – A property formerly used as a military range that is no longer under military control and had been leased by the DoD, transferred, or returned from the DoD to another entity, including federal entities. This includes a military range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager (MGDERP, September 2001).

Transferring Range – A military range that is proposed to be transferred or returned from the DoD to another entity, including federal entities. This includes a military range that is used under the terms of a withdrawal, executive order, act of Congress, public land order, special-use permit or authorization, right-of-way, or other instrument issued by the federal land manager or property owner. An operational or closed range will not be considered a "transferring range" until the transfer is imminent (MGDERP, September 2001).

Unexploded Ordnance (UXO) – Military munitions that have been primed, fuzed, armed, or otherwise prepared for action and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material, and remain unexploded either by malfunction, design, or any other cause (10 U.S.C. 101(e)(5)).

UXO Technicians – Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III (Department of Defense Explosive Safety Board TP18, December 2004).

Appendix B

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°F	degrees Fahrenheit
ANG	Air National Guard
AGS	Air Guard Station
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
BG	background
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CHE	Chemical Warfare Materiel Hazard Evaluation
CHF	Contamination Hazard Factor
COC	chain-of-custody
COPEC	contaminants of potential ecological concern
CSE	Comprehensive Site Evaluation
CSM	conceptual site model
CWM	chemical warfare materiel
DAF	dilution attenuation factor
DERP	Defense Environmental Restoration Program
DL	detection limit
DMM	discarded military munitions
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DQO	data quality objective
EcoSSL	Ecological Soil Screening Level
EESOH-MIS	Enterprise Environmental, Safety, and Occupational Health-Management Information System

EHE	Explosive Hazard Evaluation
EOD	Explosive Ordnance Disposal
ERPIMS	Environmental Resources Program Information Management System
ESS	Explosives Safety Submission
EX	Ex-situ sample
FAA	Federal Aviation Administration
FUDS	Formerly Used Defense Sites
GIS	geographic information system
GPS	global positioning system
GW	Groundwater
HHE	Health Hazard Evaluation
HSP	Health and Safety Plan
IAP	International Airport
ICP	inductively coupled plasma
ICSM	interim conceptual site model
ID	identification
IDW	Investigation-Derived Waste
ITRC	Interstate Technology & Regulatory Council
LOD	Limit of Detection
LOQ	Limit of Quantitation
MC	munitions constituents
MCE	Maximum Credible Event
MEC	munitions and explosives of concern
MGFD	munition with the greatest fragmentation distance
mg/kg	milligrams per kilogram
MIS	management information system

mm	millimeter
MMG-TLI JV	Munitions Management Group, LLC and TLI Solutions, Inc. Joint Venture
MMRP	Military Munitions Response Program
MPF	Migration Pathway Factor
MRA	munitions response area
MRS	munitions response site
MRSPP	Munitions Response Site Prioritization Protocol
MS/MSD	matrix spike/matrix spike duplicate
NA	not applicable
NAD83	North American Datum of 1983
NAS	Naval Air Station
ND	Non-detect
NFA	No Further Action
NGB/A7OR	National Guard Bureau, Air National Guard, Installations and Mission Support Directorate, Operations Division, Restoration Branch
NIST	National Institute of Standards and Technology
NJANG	New Jersey Air National Guard
NJDEP	New Jersey Department of Environmental Protection
NKSH	No Known Or Suspected Hazard
OB/OD	open burn/open detonation
PAH	polynuclear aromatic hydrocarbon
PDF	Portable Document Format
ppm	parts per million
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control

QUAL	qualifier
RACER	Remedial Action Cost Engineering and Requirements
RF	Receptor Factor
RPD	relative percent difference
RSD	relative standard deviation
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SAR	small arms range
SB	subsurface soil sample
SJTA	South Jersey Transportation Authority
SOP	standard operating procedure
SRM	Standard Reference Material
SS	surface soil sample
SSL	soil screening level
SW-846	Test Methods for Evaluating Solid Waste, Physical/Chemical Properties, Final Update IV
µg/L	micrograms per liter
U.S.	United States
URS	URS Group, Inc.
USACE	United States Army Corps of Engineers
USAF	United States Air Force
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit
UTM	Universal Transverse Mercator
UXO	unexploded ordnance

WP	Work Plan
XRF	X-ray fluorescence

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Appendix C

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Appendix D

PDF of documents provided electronically on CD.

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